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In this issue . . .

"The fear of the Lord is the beginning of Wisdom."
Psalm 111:10

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Putting Things in Perspective

For several years, the Executive Council of the American Scientific Affiliation has been discussing the advisability of publishing a "popular insert" to the *Journal*. The major purpose of such an addition would be to provide perspectives on science and Christian faith to that large segment of the Christian community which is not directly involved with the technical aspects of science, and hence its interactions with Christian faith. Many of these people want to know how to respond to those in our society who arrogantly claim that "science has disproven the Bible." The Council and others in the ASA believe that we have a responsibility to communicate with these nonscience people in an understandable manner on the current issues involving science and faith. Walt Hearn, the editor of our readable and informative *Newsletter*, has agreed to edit such an insert. The first of his efforts appear in the March issue. Let Walt or us know your reactions to this endeavor. Distribute it among your friends who could profit by a lighter fare than the often theoretical and exploratory articles of *Perspectives on Science and Christian Faith*.

In the first paper of this issue of *Perspectives* Paul Arveson summarizes the interrelationships among the persons of the Trinity, and compares these relationships to numerous types of human associations. He concludes that the biblical norm and, therefore the ideal, is "community," the association in which we find unity, diversity and equality. Absence of any one of these three components results in less than an ideal group relationship. This combination of unity, diversity and equality should characterize the Christian church and parachurch groups such as ASA.

Ronald Philipchalk suggests an application of the principle of instrumentalism to theorizing and counseling in psychology. This principle was developed by John Byl in this journal in March 1985. Separation of theory from reality could be helpful to Christian psychologists who see usefulness in one or more of the various secular theories used in psychology.

Joseph Spradley discusses the difficulties of an autonomous science that considers itself superior to other forms of knowledge and roads to truth. Spradley reminds us that: science is finite and fallible; theological/metaphysical explanations are at least potentially valid; the empirical cannot be completely separated from the theoretical; and, science is influenced by its historical and cultural context.

David Wilcox, who provided us with "A Taxonomy of Creation" in December 1986, discusses three different "theistic" frameworks as they apply to mutation, natural selection, species stasis, and species change. With God as "Prime Mover," these key features of evolution become primarily *metaphysical*; with God as "Craftsman," He is merely operating in a *deistic* mode. Only as sovereign "King" can we consider God as Creator and Sustainer in a truly *theistic* model.

George Murphy considers another dimension of creation as he emphasizes that creation is both "out of nothing" *and* mediated. He discusses this apparent paradox with its application to creation in the beginning, in healing from disease, and in peacemaking. Both Murphy's paper and Wilcox's should make us aware that God is involved in origins and in subsequent events, and that His methods often overlap in time and space.

Among the Communications in this issue are David Siemen's comments on Walter Thorson's discussion of Owen Barfield's distinction between alpha- and beta-thinking (June 1986), and another of Raymond Seeger's biographical sketches—this time he considers the life of Julian Sorell Huxley, biologist and writer.

WLB

A Relational Analysis of Social Groups

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Is there a model of social group relations taught in Scripture and appropriate as a model for social groups in general? This paper suggests that there is such a model, based on the complementary or "dialogical" relations of unity, diversity, and equality found in two Christian doctrines: the Trinity and the Church. The relational structure in these doctrines is applied here to an analysis of social group relations; however, it is clear that there are many other possible applications of this general relational structure. The analysis reveals both ideal, and a variety of less-than-ideal, group relationships.

Introduction

Biblical thinking is relational, as Dr. James Houston and many other theologians have emphasized.[1] This means that the Bible focuses on personal relationships, not on isolated individuals or impersonal programs. The Bible says a great deal about the relationships of God to man, Creator to creature, and Redeemer to redeemed. Ancient Greek thought focused on the composition of things, that is, the essential substances or elements of which they are made. Hebrew and Christian thought seeks instead to know how we are to *relate* properly to God, others, and the world. The Greeks assumed the stance of an objective, autonomous external observer "seeing" the world to arrive at a world "view": an *understanding*. We should seek, rather, how to *stand under* our Creator as creatures immersed in the life-world of all other creatures (also made in the image of God), not detached but passionately involved in personal commitments to what we believe—but cannot "objectively" know—to be true and real.[2]

What follows is a model of relationships that I have abstracted from biblical doctrine and teaching. I offer this not merely as an academic exercise but as my attempt to help organize our thoughts on the subject of group structure, and to centralize them around a model drawn primarily from the Bible rather than elsewhere.

There is a special form of logic that applies to biblical relationships: a two-dimensional form of logic in which two different concepts complement each other to form a more complete whole, a well-balanced definition of doctrine. Often Christian doctrines appear to be in opposition, when they are taught in isolation from other doctrines. Seen as a whole, they are not contradictory but constitute a multi-dimensional unity. This complementary logic is widely called "dialogic"; I described its structure more fully in a previous article.[3] The application of dialogic to Christian doctrine is not a new or original idea. It is a well-known approach among many writers to reconcile so-called "paradoxes"

of biblical teaching.[4] In the earlier article, I also suggested that a third dimension of structure could be added to make a triplet of mutually complementary ideas which together would more fully describe basic Christian doctrines. In what follows, I suggest how one doctrine may be described in such a way; namely, the Trinity.

The Trinity doctrine is historically the first case of a complementary reconciliation of Christian teachings. By the fourth century, many heretical spinoffs of Christology had been generated, and the Church fathers who gathered at Nicaea in 325 A.D. had to wrestle with Arianism, Macedonianism and other alternatives. The creed they hammered out made it explicit that Christianity teaches that God is one substance existing in three persons. This basic formula has remained the distinction of orthodox faith ever since. The Nicene Creed states in part:

> We believe in one God the Father Almighty, Maker of heaven and earth, and of all things visible and invisible;
>
> And in one Lord Jesus Christ, begotten of the Father before all worlds, God of God, Light of Light, Very God of Very God, begotten, not made, being of one substance with the Father by whom all things were made. . . .
>
> And we believe in the Holy Spirit, the Lord and Giver of Life, who proceedeth from the Father and the Son, who with the Father and the Son together is worshiped and glorified. . . .[5]

The Reformers reaffirmed the Trinity as a doctrine taught in Scripture. They formulated carefully-worded confessions that elaborated on the Trinity, such as the Westminster Confession of 1647. Following are some relevant portions of this confession:

> In the unity of the Godhead there be three Persons of one substance, power and eternity: God the Father, God the Son, and God the Holy Ghost.
>
> The Son of God, the second Person in the Trinity, being very and eternal God, of one substance, and equal with the Father, did, when the fullness of time was come, take upon him man's nature, with all the essential properties and common infirmities thereof, yet without sin: being conceived by the power of the Holy Ghost, in the womb of the Virgin Mary, of her substance. So that two whole, perfect, and distinct natures, the Godhead and the manhood, were inseparably joined together in one person, without conversion, composition, or confusion. Which person is very God and very man, yet one Christ, the only Mediator between God and man.
>
> The Holy Spirit, the third Person in the Trinity, proceeding from the Father and the Son, of the same substance and equal in power and glory, is, together with the Father and the Son, to be believed in, loved, obeyed, and worshiped throughout all ages.[6]

In these orthodox Catholic and Protestant affirmations of the Trinity, three kinds of relational terms are evident: 1.) *Unity* (U): Consanguinity, relatedness, sharing in the same substance or essence, oneness; 2.) *Diversity* (D): Difference, variety, contrast, distinction, dissimilarity, individuality; 3.) *Equality* (E): Parity, co-importance, equivalence, commonality, mutuality, impartiality, equally essential to the whole, interdependence, fairness. In the Trinity all three of these relational terms are operating simultaneously and eternally as *one relationship.*

The Nicene Council and subsequent councils of the Church, in affirming all three of these relations in the Godhead through a synthesis of all the relevent scriptures, thereby offered an inspired answer to the nagging "one and many problem" of Greek philosophy. This is in my estimation one of the most important intellectual achievements in history (made possible only through God's revelation of Himself in Scripture).

Of course there is nothing new here to those who are acquainted with Church history. But I have quoted these confessions at length to establish the historical roots of what I will subsequently call the UDE relationship. In its most general form, the UDE relationship can be expressed as follows: *A plurality of members form one whole composed of diverse kinds of individuals, all sharing equally in their importance to the whole.* This is *one* relationship, not three. Notice that the UDE relationship is itself structured in UDE form: the three terms are all necessary to comprise a complete relationship, they are all different, and they are all equally

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important to the whole. The UDE relationship is thus self-consistent and self-defining. It describes its own structure; I believe this is a unique property of this relationship. The thesis of this paper is that the UDE relationship is evident in the Creator Himself, His word, and all of His works. Furthermore, that such a relationship—given appropriate terminology—is the normative model for social relationships among persons made in His image, from families to nations.

The Body Relationship

The Trinity is not the only Christian doctrine in which the UDE relationship is evident. A more biblically explicit example is in the description of the Church/body relationship given by Paul in I Corinthians 12 and elsewhere. In this familiar passage, Paul in verses 4–8 establishes the basis for unity in the Church: all share in the same Spirit, Lord, and God. The one purpose is the "common good." But diversity is also acknowledged—there are "varieties of gifts" apportioned individually as the Spirit wills (v. 11). In verses 12–26 Paul makes the analogy to the physical body. He shows that it is absolutely necessary for there to be diversity among the members of the body, yet there is still only one body. He rejects the notion of conformity: that all the members should be the same.

The Trinity doctrine is historically the first case of a complementary reconciliation of Christian teachings.

He rejects the notion of independence of the members, which denies the unity of the body. He also affirms the essential equality or co-importance of all the parts. God even provides a compensation so that the greater honor is given to the "inferior" part, "that there may be no discord in the body, but that the members may have the same care for one another. If one member suffers, all suffer together; if one member is honored, all rejoice together." I take this passage to be the crux of biblical social philosophy. It also suggests an advanced natural philosophy. Only within the last 30 years have biologists begun to realize the profound interrelationships existing in the body—relationships that are now termed "organic unity."

At the lowest level, the human body (or any higher plant or animal) is composed not of continuous matter but of discrete cells. Each cell is a self-contained unit which generates its own energy and is capable of self-reproduction. Yet there are many kinds of cells of diverse types, all cooperating to carry out some needed function. Recently, biologists demonstrated the amazing fact that each cell contains the genetic information sufficient to replicate not only its own kind of cell, but the entire body! Here it is true that all are in one and one is in all.

The UDE relationship is evident in the Creator Himself, His word, and all of His works.

In I Corinthians 12, Paul was apparently describing the physical body on the level of its organs. Each organ is indispensable to the normal functioning of the body: "When one member suffers, all suffer together." Pain in one part is experienced globally. We now know that coordination among the different organs is maintained by various "chemical transmitters" that provide stability by "regulatory feedback." These mechanisms insure that there is no discord or division in a healthy body or any of its organs. There is an autonomic nervous system that operates constantly and automatically, but there is also a central nervous system that operates dependently at the command of the brain, to organize the entire body toward one common overall purpose (gather food, flee danger, find a mate, *et cetera*).

For humans made in God's image, that purpose should be to "glorify God in your body" (I Cor. 6:20). Paul's exhortation, elaborated in Ephesians 4, is for our physical bodies to gather together and organize themselves into spiritual bodies: churches. On the highest level, there is one global body, which is the Body of Christ: " . . . speaking the truth in love, we are to grow up in every way into him who is the head, into Christ, from whom the whole body, joined and knit together by every joint with which it is supplied, when each part is working properly, makes bodily growth and upbuilds itself in love." There is a form of "organic unity" on every level of our existence in God's world. It is amazing that this familiar Bible teaching has been "discovered" by scientists only recently. In 1869 Ernst Haeckel coined the term "ecology" (from the Greek word for "household") to describe the study of relationships among living things and their environment.[7]

Application to Social Relationships in General

Our physical bodies function quite well automatically (at least when we are healthy), and our organs carry out their functions without any conscious effort

or attention. This is as their Creator intended. Unfortunately our social structures don't function nearly so automatically. Healthy bodies are common, but smoothly-functioning and productive groups of people are rare indeed. Why? Because, as all Christians are aware, the Fall affected all our relationships—with God, with impersonal creatures, with other persons, and with ourselves. All these relationships are now flawed. We now live in the world of the "flesh," whose works include "enmity, strife, jealousy, anger, selfishness, dissention, party spirit, envy" (Gal. 5:20).

However, as Christians, we have been given the capacity for regenerating all our relationships. We do not need to suffer the judgments of the Fall fatalistically, since God has given us His Spirit as a Motivator and his word as our guidebook. The Bible has a great deal to say about social relationships. Unfortunately, even in a group composed of godly Christians who are humbly committed to a common mission, there still remains the practical question of how they are to constitute their group's structure. What is the biblical norm for groups in general? What are the consequences if that norm is not followed?

Relational Analysis of the Biblical Norm

As I have suggested above, the ideal or "normative" group relationship has the UDE structure, as described in I Corinthians 12 and elsewhere. There are many other passages that could be selected to show the importance of each aspect of the UDE relationship in social groups. For example:

Unity:

John 17:20–23—"that they may be one even as we are one"

Philippians 2:1–5—"Be in full accord and of one mind"

There is a form of "organic unity" on every level of our existence in God's world.

I Peter 3:8—"Have unity of spirit, sympathy, love of the other brethren"

Psalms 133:1—"How good and pleasant it is when brothers dwell in unity"

Ephesians 4:13—"until we all attain to the unity of the faith"

Diversity:

I Peter 4:10–11—"stewards of God's varied grace"

Romans 12:3–6—"Having gifts that differ according to the grace given to us . . . "

I believe this UDE relationship—full biblical community—is not just an abstract ideal but a goal that can be approached in practice.

Ephesians 4:7–12—"But grace was given to each of us according to the measure of Christ's gift"

I Corinthians 7:17—"Let every one lead the life which the Lord has assigned him, and in which God has called him"

Romans 14:1–7—"Let everyone be fully convinced in his own mind"

Equality:

II Corinthians 8:14—"as a matter of equality your abundance at the present time should supply their want, so that their abundance may supply your want, that there may be equality" (This passage describes a kind of "leaning over backwards" to compensate for economic injustices—what is now called "affirmative action"—in order to maintain equality.)

Galatians 3:28—"There is neither Jew nor Greek, there is neither slave nor free, there is neither male nor female; for you are all one in Christ Jesus"

I Corinthians 11:11–12—"In the Lord woman is not independent of man, nor man of woman"

Based on these passages from Scripture, an abstract description can be derived of the kind of relationship that is biblically normative. The language used depends on the kind of group; the description below is appropriate for a local church or institutional group. Similar descriptions could be made of smaller groups (such as families) or larger groups (such as nations).

1. The normative group has *unity*: its members are of full accord and one mind; they have unity of spirit, sympathy, mutual love and concern; they bear one another's burdens as well as their own; they have tender hearts and humble minds to maintain their unity at the expense of individuality, in case disagreements arise.

The weakness of hierarchies is their denial of the principle of equality. Tyranny and oppression are the rule.

2. This group also encourages *diversity*: each person knows what his gifts are and exercises them freely and with confidence; there is no favoritism, no discrimination, no priviledged class, no special honor granted or received—but every one is honored. Of course some gifts, such a administrative leadership and teaching, have high visibility and thus tend to carry more honor and priority. But there is appropriate compensation so that extra honor is given to the less visibly gifted. (This is what electrical engineers call "negative feedback.") All the members are accepted and their gifts are put to good use in hard work. There is therefore no cause for envy or jealousy or rivalry. Members know their own strengths and weaknesses, and hold themselves and others in high esteem. If the work is appropriate to one's gift, it is enjoyable as well as productive. "Happy is he who has no reason to judge himself for what he approves" (Rom. 14:22).

3. The normative group practices *equality*. All share equally in Christ, in honor, and in the functioning of the Body. Perhaps equality is not the best word here, but there does not appear to be a good English word to express the relationship of co-importance, mutuality and interdependence that is the emphasis in the scripture passages. "Coeval" is better, but unfamiliar. Paul used the word *isotes* (fairness, equality) in II Corinthians 8:14. I will retain "equality" in spite of its ambiguity, because this term will allow more general applicability of the UDE model.

I believe this UDE group relationship—full biblical community—is not just an abstract ideal but a goal that can be approached in practice. God doesn't exhort us to do what is impossible.

Subnormal Group Relationships

The failure of a group to achieve the normal UDE structure in its relationships may be caused in many ways, but the result is predictable in terms of relational analysis: *one or more of the three UDE terms is denied or diminished, resulting in a simpler, more impoverished structure.* Table 1 describes seven possible subnormal structures with appropriate names for each. (Note: The order in the table does not imply any kind of developmental change in group structure with time. Groups may change in any way between these forms. The table is meant only to suggest the eight possible forms that may exist in groups. Also it should be clear that these structures are a matter of degree, depending on the relative emphasis of U, D, and E.)

Following is a further description of the non-community group structures in Table 1:

Hierarchy is the most common institutional relationship. This relationship is the wide avenue travelled by government, kingdoms, caste systems, aristocracies, and authoritarian religious "bodies" such as the Roman Catholic Church. They are based on the idea that "someone needs to take charge," like the Israelites who demanded a king. Such a relationship tends to be stable because "the rich get richer and the poor get poorer." That is, the spread betwen higher and lower ranks tends to become wider over time: a "concentration of power." Hierarchies have a "chain of command" that maintains strong unity of purpose and action, and its specialization of labor results in a high efficiency in carrying out orders. Hence, all military and police organizations are hierarchical.

The weakness of hierarchies is their denial of the principle of equality. Tyranny and oppression are the rule. Even in a hierarchy with good leadership, the leadership potential and gifts of the lower-level people are not fully utilized, so progress is slow and morale is often poor.

A conformist group is inherently uncreative and unresponsive, prosaic and serious.

A ***Conformity*** results from the suppression of existing diversity in a group of individuals. This situation occurs in some cults, police states, corporations, and mass movements, and to a lesser extent in many other kinds of working groups. Generally one person, with his special beliefs, values, and lifestyle becomes the norm for the entire group. In some cases, it is not a person but a system of rules or traditions that is the norm. In either case the value and importance of freedom is reduced. There is no consideration of alternatives. The conformity is maintained not by rank or power, but by fear of

Table 1

Basic Types of Group Relationships

Relation Terms	*Name*	*Description*
UDE	Community	One group of variously-functioning but equally-needed individuals with agreement on a common purpose but diverse in actions.
UD	Hierarchy	A unit organized under one leader and purpose with a rank of levels of importance and authority among diverse individuals.
UE	Conformity	A collection of equal individuals all adhering to one and the same norms, purpose and actions without distinction as to gifts or roles.
DE	Plurality	Loose-knit group of diverse but equal individuals with unresolved disagreements as to purpose and actions.
U	Monism	Mob rule; loss of individual identities in the overriding actions of the group towards one purpose.
D	Relativism	"Everyone does what is right in his own eyes"; no cooperation or mutual organization, just tolerance.
E	Dualism	Group split into two or more polarized factions with no common purpose or actions.
O	Anarchy	No relations or common rules between individuals; distrust prevents formation of group.

nonconformity, peer pressure, and the inability to compete as a minority. Equality is assured by the conformity of everyone to a single norm, and unity is maintained by their self-imposed cohesiveness.

The weakness of a conformist system is due to its sameness, its lack of needed diversity. There may be little specialization; everyone is expected to do the same things irrespective of individual gifts and abilities (or lack of them). Thus, the whole group is in practice specialized according to the artificially-imposed standards of its leader or prototype. A conformist group is inherently uncreative and unresponsive, prosaic and serious. Like any over-specialized species, it is very vulnerable to any change in environment. If the leader leaves or dies, the group usually loses much of its influence. Jealousy and rebellion are constant sources of competition, so such a system tends to be unstable and transforms into another structure. Many "personality cults" follow this pattern.

A ***Plurality*** means more than just a loose-knit collection of people. It is a group in which different people may all have equal power and whose special gifts are recognized, but the individuals are not united in purpose and action. Such a structure is quite common in our democratic ("pluralistic") societies. The supreme advantage of such a structure is that is promotes fair dealing and peaceful coexistence among people who have diverse opinions. They may "agree to disagree." Pluralism offers plenty of individual freedom of expression, which must be tolerated by those who disagree.

Pluralities are found especially among volunteer-based groups, where there is little real working organizational unity, where "everyone has a right to his or her opinions," where there is no common authority or means of enforcing a "party line." In a pluralistic group, although there may be freedom, morale, and good will, there is a lack of effective action. Creative ideas may abound, but accomplishments are few. This is a "disorganized" or "fuzzy" group. There is no "central nervous system" to provide decisive command and control; no clear and continuous channels of communication to insure coordinated actions of the various members. There may not even be a "leader" at all. Decision-making is a tedious, clumsy, tiresome process (as evidenced in the U.S. Congress, for example). The structure of a pluralistic group does not provide any clear way in which differences of opinion may be resolved. Compromises are sometimes achieved, but no one is ever compelled to change an opinion for the sake of group unity. Hence a pluralistic group may be stable, but it is not consistent in its policies or steadfast in its actions.

The next three types of relationships are those in which there is significant negation of *two* of the three UDE principles. Such rejection serves to *exaggerate* the remaining principle to an extreme degree. Such exaggerations cause pathological situations in the functioning of groups.

Monism, in terms of social structures, is mob rule—in which the separate existence of individuals (not to mention their distinctions) are subsumed by the over-

riding single-minded action of the group. An extreme form of unity is upheld in the mob. The action of mobs in riots is predictable and has been extensively studied by East European governments. The purpose of a mob is easy to thwart, because it actions are simple, overt, and inflexible in the face of situational changes. Thus the monistic group relationship and its underlying objective are transient and ineffectual.

Relativism—a relationship based entirely on diversity—means that "everyone does what is right in his or her own eyes." In such a group, there is no common ground; not even a shared disagreement. There may be much independent activity, but no ability to combine forces and focus on a single problem: no cooperation. No one "belongs" to the group or takes sides in a dispute. This was the situation with the world's nations after Babel. Relativism limits the effectiveness of international justice among nations and ecumenical movements among denominations. "All we like sheep have gone astray; we have turned each one to his own way." There may be plenty of freedom and tolerance, but it doesn't mean much, because no one trusts anyone else—no one can organize, so no worthy goals can be achieved.

A pluralistic group may be stable, but it is not consistent in its policies or steadfast in its actions.

Dualism, in this context, is the consequence of a division or power-struggle in the leadership of an organization in which everyone is compelled to take a stand on one side or the other. The group is, as we properly say, "polarized." At this stage it is still one group, however, because some operational structure exists, but there is a crisis in leadership in which the purposes and actions of the group are going in two different directions at once. This situation is unstable, of course, and eventually results in division of the group (secession, schism, or divorce). Alternatively, each faction may attempt to "swallow up" the other in a hostile takeover. It seems that the closer the two sides were before a split, the more they hate each other afterwards—as, for example, in the case of religious schisms over what to outside observers may appear to be unessential points of doctrine. This process seems to be happening currently in the Iran/Iraq war between the Sunni and Shi'ite Muslims. A third manifestation of dualism is a kind of seesaw or pendulum cycle back and forth between the two poles of policy, where the group as a whole never reaches a state of equilibrium or compromise between the two positions. In each of these three manifestations, equality of power in the two sides works to prevent the development of unity.

By encouraging the weakest principle, the structure of the group can perhaps be changed to make it approach more nearly to the ideal form.

Anarchy—the last item in Table 1—means simply the absence of any group. The group has dispersed or become so alienated that there is no communication, and thus no relationship, of any kind between individuals. Every issue, every person is irrelevant. It differs from relativism in that there is no obligation to tolerate diversity. This is a much stronger sense of "anarchy" than civil anarchy (which might sill contain cohesive groups led by "war lords"). Civil anarchy is anarchy on the national level. This tragic state of affairs is equivalent to total war, in which there are no bonds of trust or respect, and thus danger is all around.

Now, according to this analysis, the entire range of structural possibilities for groups has been described. If this analysis is correct, it predicts that most functioning groups will be found to fit into one of the first three types (Hierarchy, Conformity, or Plurality). By studying the beliefs and behavior of a particular group with respect to the three principles or sub-relationships (U, D, and E), it may be possible to identify the weakest of the three. Then, by encouraging the weakest principle, the structure of the group can perhaps be changed to make it approach more nearly to the ideal form: "until we all attain to the unity of the faith and of the knowledge of the Son of God, to mature manhood, to the measure of the stature of the fulness of Christ" (Eph. 4:13).

Obviously the Mystery of the Holy Trinity, the Mystical Body of Christ, and everything in the universe is richer and more complex than the UDE relationship can be described in words.

I hope that this analysis of group structure is useful in two ways: as a descriptive model that may help to clarify complex isues, and as a prescriptive model that suggests a goal—a normative structure—to which people in a group can aspire through increased communication, innovative management-labor interaction, a written constitution, salary adjustments, or whatever means are appropriate to the group.

Conclusion

We live in a world whose complexity creates confusion, so some simplifications can be helpful. All abstractions are in some sense erroneous. But the payoff is in their power to organize large amounts of material, as a scientific theory can be expressed in a mathematical formula. Historically, Western thought has preferred abstraction to doing nothing.

The real issue here is whether the UDE model is a good abstraction or a bad one. Certainly there have been abuses; false analogies to the Trinity abound. It seems as though any three things have been linked to the Trinity at one time or another. Nevertheless, I believe the UDE abstraction is valid in several respects: a.) it is relational, not three essences; b.) it is self-consistent; c.) its application to the Church is essentially biblical; and, d.) like the Church councils that composed the Creeds, it does not presume to seek a higher level of integration of the three relationships, but makes them all final and absolute. Obviously the Mystery of the Holy Trinity, the Mystical Body of Christ, and everything in the universe is richer and more complex than the UDE relationship can be described in words. But the motive of language is to make life more intelligible, while trying to preserve some of its essential truths.

Now the reader may be prepared to accept my confession: I am not a sociologist, nor am I especially knowledgable in the subject of social groups. I have used the topic of social groups as an illustration to clarify the meaning of the abstract UDE relationship, and to show that it is a biblically-based model.

For many years I have wondered, "Is there a link between the abstract relations in Christian doctrine and the structure of the world?" If the question is taken as seeking a "real," ontological link, it may be seen as an unwarranted intrusion of Greek metaphysics into theology.[9] But if the question is merely to seek commonality among a variety of theological and metaphysical concepts, then perhaps the question is a fair one and comes within the realm of conventional logic and linguistics. I accept this limitation of scope on the inquiry.

The UDE model of relationships is very general, and I have found it useful in describing structures in physics, personhood, system theory, *et cetera*. As a linguistic or didactic tool, it has been helpful to me in clarifying ideas. It may have more profound implications also. In the future, God willing, I plan to investigate the dialogical structure of other Christian doctrines in an attempt to discover more general underlying structures.

NOTES

[1]James M. Houston, *I Believe in the Creator*. Eerdmans, 1980.

[2]This terminology owes much to Houston's Calvinistic emphasis on God's sovereignty. It also implies the epistemology of Michael Polanyi, as in his book *Personal Knowledge*. University of Chicago Press, 1958.

[3]Paul T. Arveson, "Dialogic: A Systems Approach to Understanding." *Journal of the American Scientific Affiliation* 30, 2 (June 1978).

[4]The examination of the concept of complementarity in this journal began with the article "The Relevance of the Quantum Principle of Complementarity to Apparent Basic Paradoxes in Christian Theology" by Richard Bube, *Journal of the American Scientific Affiliation* 8 (1956); Dr. Bube's first article in the Journal. Recently Dr. John Haas has written two assessments of complementarity (the "classical" complementarity of Niels Bohr and the "logical" complementarity of D.M. McKay) in *Journal of the American Scientific Affiliation* 35, 3 & 4 (Sept. and Dec. 1983).

[5]The Nicene Creed, in *The Book of Confessions of the United Presbyterian Church in the United States of America*, 2nd ed., 1970.

[6]The Westminster Confession of Faith, *ibid.*

[7]See also Michael Polanyi, "Life's Irreducible Structure." *Journal of the American Scientific Affiliation* 22, 4 (Dec. 1970).

[8]A similar emphasis on relations is given in H. Newton Maloney, "1+1 = Organization." *Journal of the American Scientific Affiliation* 30, 1 (Mar. 1978). Maloney's article places great emphasis on the unity term in organization.

[9]For a philosophy that places primary focus on relation (rather than God) as the fundamental reality, see Harold H. Oliver, *A Relational Metaphysic*. Martinus Nijhoff, 1981.

Only the Spirit, if it breathe upon the clay, can create Man.

Antoine de St. Exupery, from *Wind, Sand, and Stars*

Instrumentalism in Psychology: Some Implications

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*Instrumentalism, as discussed by Byl (*Journal of the American Scientific Affiliation, *March 1985), is addressed in relationship to psychology. It is suggested that acceptance of the Instrumentalist approach gives greater freedom in theorizing, as well as justification for a far-ranging eclecticism in the realm of counseling technique. Some possible problems are identified, both for Instrumentalism and for unexamined eclecticism in psychology.*

Christians working in the contemporary field of psychology have adopted a wide variety of solutions to the problem of integrating psychology and Christianity. At a theoretical level there have been many helpful proposals for different perspectives on, approaches to, and levels of integration (e.g., Carter and Narramore, 1979; Evans, 1977; Farnsworth, 1985; Kotesky, 1980; Philipchalk, 1987). Each of these, in one way or another, attempts to provide guidelines for the task of bringing together Divine revelation in Scripture and scientific observations of human thought and behavior.

At the level of basic psychological research and theorizing, there appears to be little difference in the approaches of Christians and non-Christians. Although some have questioned the basic assumptions involved (e.g., Van Leeuwen, 1982), most Christians operating on the basis of "all truth is God's truth" conduct their research and construct their theories in pretty much the same way as their secular counterparts.

At the practical level of counseling, most Christians are eclectic in their approach to counseling theories. They accept what they feel they can from secular approaches, sometimes after a process of careful evaluation of assumptions and implications, and sometimes with more of an eye towards the success rate of the particular approach and its techniques.

The present paper suggests some important considerations for Christians involved in research and theorizing in psychology, and in doing so presents a possible justification for an expanded form of eclecticism in counseling psychology.

An Old "New Approach"

Science, psychology's model since its inception, has been undergoing an upheaval in recent years, to the extent that Kuhn (1970) has called the present period one of "extraordinary science." Van Leeuwen (1982)

has furthermore suggested that psychology need not follow science any longer, but search out a new paradigm for its own purposes. One approach which may be beneficial is really an old one which has fallen into disuse—the concept of Instrumentalism.

Instrumentalism is a concept which has resurfaced from time to time since the days of Plato (427–347 B.C.). It is a view of scientific enquiry which is based upon a clear distinction between data and theory. The data are the factual bases upon which all observers agree. Theories, on the other hand, are attempts to explain, extend, and integrate various sets of data. Whereas "realists" assume that theory is in some sense, however tentative, a description of what actually exists, "Instrumentalists" make no such assumption. For Instrumentalists, a theory is nothing more than a "useful fiction." Its propositions should be internally consistent and empirically verifiable, leading to increasing accuracy in prediction; but no matter how accurate, its status as theory is preserved and it is never taken to be a description of reality.

For centuries, this approach has protected favorite views of reality from the attack of opposing scientific theory. It allowed Aristotelians to preserve their more aesthetically pleasing view of celestial motions, while at the same time *making use* of the opposing Ptolemic theories to *actually predict* these motions. It permitted religious astronomers at the time of Copernicus to *make use* of his theories without disturbing their geocentric view of the cosmos. Today, Instrumentalism enables physicists to *use* wave-theory to predict the behavior of light in one situation, and particle-theory to predict its behavior in another. In each case, a view of reality (aesthetic, religious, Newtonian, unknowable, *et cetera*) is maintained, while a theory (which if accorded the status of actual description would destroy the original view) is employed in a purely utilitarian way.[1]

The Christian mathematician and astronomer John Byl has presented a clear argument for the application of Instrumentalism by contemporary Christian scientists. Not only does Instrumentalism have obvious practical rewards in enabling Christians to make use of secular theory, but it rests upon a basic unwillingness to endorse the trustworthiness of human speculation insofar as that speculation makes a claim to understand what "really is." This is not all bad. As Professor Byl says: "If modern man has now finally come to the realization that the human intellect has severe limitations in its ability to attain objective truth, then this should be a cause for rejoicing rather than concern" (p. 17).

Instrumentalism in Psychology

But what of Instrumentalism in psychology? Let's consider the role of Instrumentalism in psychology generally, and then look at some specifically Christian concerns.

First, Instrumentalism is already used in a variety of areas, although often without being recognized.

1.) Contemporary experimental psychologists are often described as "methodological behaviorists" (as opposed to "radical behaviorists") because they operate, at least in the laboratory, as if the strict behaviorist assumption of complete determinism were true, even though they may not believe it is in every situation (especially in their personal lives).

2.) The fields of computer modeling and artificial intelligence attempt to simulate human thought with computers (a useful theoretical endeavor), although no one really believes that human thought is based on a simple binary code.

3.) Phenomenology, wherever it is found, recognizes that the individual often acts *as if* certain things were true, whether or not they are (e.g., Freud's controversial shift in emphasis from real to imagined childhood seduction is a phenomenological instrumentalist step).

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In each of these situations, a useful theoretical framework is developed without necessarily accepting any part of it as a strictly literal description of reality.

For Instrumentalists, a theory is nothing more than a "useful fiction."

However, while the idea of theory as "useful fiction" may be readily accepted, its tentative nature is all too often forgotten and the fiction assumes the status of reality. This is especially likely as a theory is refined to yield better and better predictions. In many areas of psychology, the consequences of this leap in logic may be relatively harmless; they may even be beneficent. For example, the assumption that the "three-stage" model of memory has a basis in reality may lead to the discovery of important neurophysiological structures underlying the various functionally distinct "stages." In this way, a theory may provide helpful clues in the search for physiological bases for theoretical constructs. However, in the confusion of theory with reality there is always a danger of either assuming the physical existence of something because it parallels a useful theoretical concept (e.g., searching endlessly for a point of interaction between mind and body—pineal gland? left hemisphere? frontal lobes? reticular activating system?), or doubting the validity of a useful concept, such as mind, because its physical existence cannot be demonstrated.

Instrumentalism may provide justification for some of the unexamined eclecticism which now exists in Christian psychological practice.

In a more obvious way, psychologists have all too often forgotten the "fictitious" nature of the theory of evolution, or the deterministic theories of environment (Skinner), or heredity (Freud), or even of materialistic science itself.[2] Each of these is a "useful fiction" which has proven valuable. But their value in one domain (theory) is insufficient to warrant extending their dominion to another (reality).

The primary danger is that the Instrumentalist assumption is often not made clear or tends to be forgotten, if not by the originators of the theory, then by those who adopt it. Thus, experimental psychologists come to accept complete determinism, computer modelers see humans as machines, phenomenologists trust the distorted perceptions of their clients, and any number of psychologists reify the "useful fictions" of materialism, scientism, evolutionism, *et cetera*.[3]

Similar advantages and dangers exist for Christian psychologists. On the one hand, Instrumentalism may provide justification for some of the unexamined eclecticism which now exists in Christian psychological practice. It may also form a healthy basis for an expanded eclecticism. When speculative knowledge (theory) is seen merely as a "useful fiction," the Christian psychologist has much greater freedom to explore its utilities. On the other hand, there are at least three important warnings that the instrumentalist Christian psychologist must heed:

1.) It is important to differentiate between when an Instrumentalist position is being adopted, and when a Realist position is assumed.

There is a constant pressure to believe that one's theories represent truth.

2.) The reflexivity and reactivity of human subjects cannot be ignored, especially when a broader instrumentalist eclecticism is employed.

3.) Whereas Instrumentalism may be a useful approach or means to an end, the end is objective and real, and therefore must conform to scriptural standards and insights on the nature of persons.

The first warning applies to Instrumentalism wherever it is employed—in the natural or the social sciences. There is a constant pressure to believe that one's theories represent truth. The dangers of ignoring the Instrumentalist assumption, once it has been made, are noted above.

The second warning applies particularly to psychology, although modern physics has also recognized the inevitability of an interaction between observer and observed. Inasmuch as a client or experimental subject can always reflect upon and react to clinical or experimental manipulation, the role of theoretical assumptions needs to be clarified. If, for example, a clinical theory is employed which focuses on the sexual basis of

motivation, clients may come to reinterpret all of their behavior as sexually motivated, or they may react to this theoretical assumption and deny even obvious sexual motivations. Presumably the Realist practitioner, having adopted this theory, has already settled in his or her own mind the literal nature of sexual motivation, and sees their client's response as either insight or denial. The Instrumentalist, on the other hand, having made no such commitment to the literalness of the theory, would not wish the client to be misled, and thus might wish to make his or her instrumentalist assumptions clear to the client. Both Realist and Instrumentalist are aware that even their implicit theoretical assumptions affect their clients. The Realist believes the theory and deals with the consequences accordingly. The Instrumentalist is more skeptical, and consequently must be more sensitive to the impact the use of a theory may have on a client.

Instrumentally employed theory must always work towards scripturally sound goals.

While the first two warnings apply more broadly, the third applies specifically to a Christian view of persons. There are many aspects of humans which are clearly specified in Scripture, including goals, and even means by which those goals are to be attained. We are to be "conformed to the image of the likeness of Christ," we are to "be perfect," to "be transformed by the renewing of . . . (our) . . . mind(s)," *et cetera*. For the Christian this is *real*, and not *instrumental*, knowledge.[4] Instrumentally employed theory must always work towards scripturally sound goals. This means that although instrumental therapists may find it helpful to treat their clients as though they were sexually motivated, or basically good, or completely determined, the goal is always to make their clients more "Christ-like."

Conclusion

Instrumentalism is an approach to theorizing which has a respectable historical and contemporary basis. It has been advocated in various forms by scientists from Ptolemy to Ernst Mach and Niels Bohr.[5] Those psychologists who feel an attachment to the traditional model for psychology, or the natural sciences, may be comforted by the assurance that Instrumentalism also developed there.

By breaking the connection so often assumed between theory and reality, Instrumentalism may set at ease the minds of many Christian psychologists who seek to utilize various secular theories. The expanded basis for eclecticism which Instrumentalism provides may also serve to inject new vitality into Christian psychology. Having affirmed our realist scriptural foundation, we are at liberty to explore wherever the data leads us—with a freedom reminiscent of C.S. Lewis' view of enquiry:

> I do not, of course, mean any attempt to make our enquiries work out to edifying conclusions. That would be, as Bacon says, to offer to the author of truth the unclean sacrifice of a lie. I mean the pursuit of knowledge and beauty, in a sense, for their own sake, but in a sense which does not exclude their being for God's sake. . . . Humility . . . encourages us to concentrate simply on the knowledge or the beauty, not too much concerning ourselves with their ultimate relevance to the vision of God. That relevance may not be intended for us but for our betters—for men who come after and find the spiritual significance of what we dug out in blind and humble obedience to our vocation. (1948, p. 33)

In the realm of theory, relevance and significance may best be found in the utility of our creative work, carefully separated from realist assumptions.

Furthermore, it is worth reiterating that far from accepting any theory as true, Instrumentalism accepts none. In this, it is based upon a fundamental humility with regard to human speculation, which Christians should find attractive.

By breaking the connection so often assumed between theory and reality, Instrumentalism may set at ease the minds of many Christian psychologists who seek to utilize various secular theories.

Finally, it is hoped that the present paper, at the very least, would: (a) generally raise the level of consciousness among Christian psychologists with regard to their use of theory, and (b) make Christian counselors in particular more aware of their basis for selecting counseling practices. Many Christian counselors are implicitly Instrumentalists. The distinctions highlighted here may allow them to be explicitly, and more broadly, eclectic in their choice of methods. On the other hand, if they are uncomfortable with some of the difficulties raised (e.g., the utilitarian approach to means in the

service of Christian ends), the present paper may force them to justify or reject some of their own methods. In either case, a step will have been taken towards a more honest eclecticism.

NOTES

1. For a more thorough examination of the role of Instrumentalism in the natural sciences, to which the present author is greatly indebted, see Byl (1985).
2. The total scientific enterprise upon which psychology has modeled itself rests squarely on: (a) the theoretical primacy of a material world, and (b) faith in the scientific method as the only way to discover that world. Both of these useful theoretical fictions are so widely used as to be accepted as fact. We need to remember William James' warning: "Science, however, must be constantly reminded that her purposes are not the only purposes, and that the order of uniform causation which she has use for, and is therefore right in postulating, may be enveloped in a wider order, on which she has no claim at all." (1890, p. 576)
3. Daniel N. Robinson, *The Wonder of Being Human* (New York: Free Press, 1984), p. 4 ff.
4. For a rebuttal of the charge that an instrumental epistemology of science assumes an instrumental epistemology of Christian faith and life, see Byl (1985, p. 16).
5. See Karl R. Popper, *Conjectures and Refutations* (London: Routledge and Kegan Paul, 1963), p. 98.

REFERENCES

Byl, J. 1985. "Instrumentalism: A Third Option." *Journal of the American Scientific Affiliation*, 35(1):11–18.

Carter, J.D. and B. Narramore 1979. *The Integration of Psychology and Theology*. Grand Rapids: Zondervan.

Eccles, Sir John and Daniel N. Robinson 1984. *The Wonder of Being Human: Our Brain and Our Mind*. New York: Free Press.

Evans, C. 1977. *Preserving the Person: A Look at the Human Sciences*. Downers Grove, IL: InterVarsity Press.

Farnsworth, K. 1985. *Wholehearted Integration*. Grand Rapids: Baker Book House.

James, William 1890. *The Principles of Psychology*. New York: Holt, Rinehart, and Winston.

Kotesky, Ronald L. 1980. *Psychology from a Christian Perspective*. Nashville: Abingdon.

Kuhn, T.S. 1970. *The Structure of Scientific Revolutions* (2nd ed.). Chicago: University of Chicago Press.

Lewis, C.S. [1948] 1984. *Fernseeds and Elephants*. London: Fontana.

Philipchalk, Ronald P. 1987. *Psychology and Christianity: An Introduction to Controversial Issues*. Washington, D.C.: University Press of America.

Popper, K.R. 1963. *Conjectures and Refutations*. London: Routledge and Kegan Paul.

Van Leeuwen, M.S. 1982. *The Sorcerer's Apprentice: A Christian Looks at the Changing Face of Psychology*. Downers Grove, IL: InterVarsity Press.

Meaninglessness inhibits fullness of life and is therefore equivalent to illness. Meaning makes a great many things endurable—perhaps everything. . . . It is not that "God" is a myth, but that myth is the revelation of a divine life in man. It is not we who invent myth; rather, it speaks to us as a Word of God.

Madeleine L'Engle, *Walking on Water*

The Abolition of Autonomous Science: Implications for Relating Science and Faith

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Since the demise of logical positivism, many scientists continue to view science as an autonomous source of reliable and certain knowledge. A review of the efforts to establish autonomy and certainty in science reveal the difficulties with this view and its eventual failure. Criticisms of autonomous science suggest the inadequacy of trying to separate science and faith, or of treating them as complementary but independent realms. The more recent historical understanding of science has opened up new possibilities as well as problems in relating science and faith.

Following World War I, European philosophy of science formed an alliance with mathematics culminating in an attitude of certainty, autonomy, and the claim that science is the only reliable source of knowledge. The rise and fall of logical positivism has been a major theme of twentieth century thought, and illustrates the danger of placing too much emphasis on science and mathematics as an ideal for all knowledge. The restriction of rational inquiry to the modes of scientific verification and the processes of mathematical logic is far too confining for the containment of truth. Not only are religious concepts rejected, but morals and values in general are viewed as not empirically verifiable, and thus meaningless.

Even after the rejection of logical positivism as a general epistemology on the grounds that scientific knowledge was not fundamentally different from other forms of knowledge, it continued to survive as a philosophy of science and became the dominant influence on American science for two decades after World War II. Thus, science became isolated from other realms of thought and the gap between science and culture became increasingly evident.[1] In particular, many Christians in science tended to separate their faith and theology from their practice and philosophy of science.

Developments in the history and philosophy of science over the last three decades have ended the autonomy of science and have made it easier to bridge the gap between science and culture. One of the earliest efforts to relate science to other forms of knowledge was developed by Michael Polanyi, who anticipated much of the recent historical analysis we will discuss here.[2] The implications of his ideas for integrating science and faith have been explored in a number of articles in this journal.[3] We will attempt a broad review of the changing ideas about science and mathematics in the twentieth century, and discuss their implications for relating science and Christian faith.

Attitudes of Autonomous Science

In the nineteenth century, natural science was accepted as a free, autonomous and reliable means for the steady accumulation of knowledge. Beginning with the facts of observation and using only tested modes of inference, science moved confidently to higher levels of generalization. In an effort to analyze the success of this procedure, an early form of positivism was developed by Ernst Mach in which science was viewed as a growing body of concepts which can be directly connected with facts given by immediate sensation.[4] Excluding any *a priori* concepts such as absolute space and time, all scientific statements had to be empirically verifiable and thus capable of reduction to statements about sensations. The difficulty with this approach was that scientific principles contain mathematical relationships not reducible to sensations alone. Mach's positivism, with its empirical emphasis and rejection of absolute space and time, strongly influenced Einstein in the development of the relativity theory.[5] Einstein's pilgrimage from empiricism to rational realism eventually led to his break with positivistic science.[6] The gradual acceptance of the new physics with its growing emphasis on mathematical theory put increasing strain on Mach's positivistic philosophy of science.

Logical positivism was the product of a group of scientists, philosophers, and mathematicians, known as the Vienna Circle, who were strongly influenced by the empiricism of Mach and the mathematical logic developed by Whitehead and Russell in their monumental *Principia Mathematica*. The logical positivists concluded that if mathematics could be reduced to logic, then mathematical statements of scientific laws could also be given in terms of mathematical logic. Thus, a scientific theory could be axiomatized by logical relations between theoretical terms, if a way could be found to link the theoretical terms with the observation statements used to describe phenomena. This was a problem that Wittgenstein had developed in his *Tractatus Logico-Philosophicus*, which was an attempt to show how the basic propositions and associated logic of the *Principia Mathematica* could serve as a theory of language.[7]

The Vienna Circle went beyond Wittgenstein by assuming that empirical facts can be brought into correspondence with basic propositions used to describe reports of sensory observations. If all other propositions except declarative ones could be eliminated, then a logically perfect language and a literal description of the world seemed possible. They linked the elements of this idealized language with facts about the world by correspondence rules to ensure the meaningfulness of each proposition. In their opinion, the cumulative success of science consisted in adding to the growing number of propositions, and linking them to obtain more complex propositions. This process appeared to offer a way to reform philosophy and integrate it with physics and biology into a single unified science. At the same time, metaphysical entities could be avoided, as they involved theoretical terms that could not be linked to explicit observational definitions. This led to the verificationist theory of meaning with its claim that all cognitively significant discourse about the world must be empirically verifiable.

Under the influence of logical positivism, science was viewed as distinct from other forms of human experience. Since only empirical propositions were considered valid, moral and ethical judgments were dismissed as pure expressions of feeling having no objective validity whatsoever. According to A.J. Ayer, "in every case in which one would commonly be said to be making an ethical judgement, the function of the relevant ethical word is purely emotive."[8] Neither assertions of value nor aesthetic judgments could have any claim to knowledge other than information about our own feelings. Since metaphysical and religious statements involve propositions that cannot be empirically verified, they too must be rejected. As a result, it was claimed that there was no ground for antagonism

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between religion and science since religious utterances are not genuine propositions at all, and thus cannot conflict with scientific propositions.

Beginning with the facts of observation and using only tested modes of inference, science moved confidently to higher levels of generalization.

Many Christian thinkers accepted the implications of logical positivism, assuming that science and Christian faith were unrelated and should be isolated in separate domains to avoid conflict.[9] Such a separation is difficult to maintain, as science and religion have many mutual concerns in seeking to understand the world and account for its order and origins. Furthermore, Christianity cannot afford to surrender the validity of its claims to truth, nor its responsibility to criticize inadequate systems of thought. The claim of logical positivism, that the only valid kind of knowledge is scientific, implied a disavowal of all other kinds of knowledge and a dichotomy between fact and value in which the latter had no cognitive status. The biblical view of human finiteness and fallibility recognizes that any such claim to certainty is suspect, and any attempt to restrict knowledge to scientific dimensions is inadequate and idolatrous.

Alterations in Autonomous Science

The ambitious hopes and confident certainties of the logical positivists came under suspicion almost from their inception. Part of this confidence was based on the success of classical physics. The challenge of the new physics culminated in the development of relativity and quantum theory and the replacement of many classical ideas and assumptions. Although Einstein had credited Mach with the rejection of absolute space and time, his approach clearly emphasized the creative formation of concepts rather than a mere ordering of empirical material. Eventually this was criticized by Mach, who repudiated his earlier endorsement of special relativity theory.[10] The ultimate success of the special and general theories of relativity challenged the very foundations of classical mechanics and introduced a radical new conceptual framework for the ideas of time, space, and matter. The non-Euclidean geometry of general relativity had only a minimum of empirical support, but brought a new unity and order into physical theory.

Einstein's extension of Planck's quantum theory and the development of the photon concept revealed further inadequacies in classical physics. The continuous fields and waves of electromagnetic theory had to be revised to take into account the quantum nature of energy and light. Quantum theory introduced even more fundamental challenges to the nature of physical science and its deterministic presumptions. Heisenberg's uncertainty principle revealed inherent experimental and conceptual limitations in science. For example, since precise values of position and velocity in an atomic system cannot be simultaneously determined, future events cannot be precisely predicted, so alternative possibilities exist.

The wave-particle duality of atomic physics demonstrated that scientific theories are not literal descriptions of nature, but require different models in describing different experimental situations. Moreover, it demonstrated that the process of observation influences what is observed, and thus concepts inevitably enter descriptions of atomic events. The response of many positivists to modern physics was to suggest that all models be discarded, and that equations should be used simply to correlate observables. However, most physicists preferred to follow the approach of Bohr, retaining both wave and particle models as complementary descriptions while recognizing their limitations.[11] Mary Hesse argued that models function in science as more than literal descriptions of nature, as devices which "can be generalized, extended and tested, and if necessary modified, as a purely formal deductive system cannot."[12]

Since only empirical propositions were considered valid, moral and ethical judgments were dismissed as pure expressions of feeling having no objective validity whatsoever.

Some Christian writers have attempted to use the idea of complementarity as a way of relating science and religion, while retaining the autonomy of each.[13] In this approach, complementary explanations in science and religion are used to address issues on different levels. However, such complementary descriptions must be complete, in terms of their own categories and on each level, to avoid the possibility of conflict. This approach can be helpful, but still tends to isolate science from faith. Furthermore, it is questionable whether such descriptions can be complete on each

level, as is required for avoiding conflicts. For example, scientific explanations cannot be complete on a scientific level, since they always depend on some philosophical assumptions that are not part of the explanation itself.[14]

The relevance of metaphysical and theological ideas would no longer be dismissed a priori *by logical positivists on the basis of their verification criterion.*

Another goal of logical positivism, the reduction of all knowledge to a single unified science, was thwarted by developments in mathematical logic undertaken by one of the members of the Vienna Circle itself. Using a meta-mathematical method introduced by Hilbert, it was shown by Kurt Gödel that axiomatic systems such as *Principia Mathematica*, if consistent, must necessarily be incomplete. Furthermore, in any formal system that includes the theory of natural numbers there are undecidable arithmetical propositions, and arithmetical concepts can be found which are not definable within the system. One evaluation of Gödel's proof concludes:

> It appears to foredoom hope of mathematical certitude through the use of obvious methods. Perhaps doomed also, as a result, is the ideal of science—to devise a set of axioms from which all phenomena of the natural world can be deduced.[15]

Even more disconcerting is a theorem proved by Skolem which says that it is impossible to characterize the number series by a finite number of axioms.[16] This is not the kind of logical foundation that will secure a unified axiomatic structure for all of science.

The inability of science to provide literal descriptions of nature, or complete axiomatic systems for the reduction of all knowledge to a unified science, began to reveal the similarity of science to more traditional forms of human understanding. The demands of creationism to interpret the Genesis account of creation as a literal scientific description suggest analogies with these unsuccessful efforts of logical positivism.[17] The need for conceptual systems in scientific theories, including concepts that cannot be defined empirically, paralleled human reasoning in nonscientific fields. The relevance of metaphysical and theological ideas could no longer be dismissed *a priori* by logical positivists on the basis of their verificationist criterion which, in fact, was exposed as self-contradictory and made science itself impossible. The objective realm claimed by science could no longer be kept completely separate from the assumed subjective realm of theology.

Attacks on Autonomous Science

Meanwhile, Wittgenstein had disassociated himself from the logical positivists and had become an increasingly skeptical onlooker. They had used his ideas in their attempt to show how a formalized theory in science could provide a representation of facts about nature; however, he recognized the problem of applying any axiomatic formalism to the world as we know it. The positivists believed that all the abstract terms of a meaningful theory could be associated with sensations or observations. Wittgenstein argued that an axiomatic theory defined only logical possibilities which could not be brought into complete correspondence with the natural world, because logical relations held only within a symbolism or language. Even in the *Tractatus* he recognized this problem:

> So too the fact that it can be described by Newtonian mechanics asserts nothing about the world; but this asserts something, namely, that it can be described in that particular way in which as a matter of fact it is described. The fact, too, that it can be described more simply by one system of mechanics than by another says something about the world.[18]

The connections between language and reality are determined by usage rather than logic. Thus, the relationships between words and the world cannot be given by formal definitions.

Since there is no theoretically neutral observation language, the goal of an empirical account independent of theoretical concepts is doomed to failure.

In Wittgenstein's later writings, he emphasized that unconceptualized sensations cannot play a direct part in building a language that will ensure autonomy and certainty. Agreeing with Kant that "percepts without concepts are blind," he suggested that our understanding of concepts should be based on a wider study of how language usage is established in order to determine what can be meaningfully said. This suggestion was followed up in mathematics by Friedrich Waismann's conceptual analysis of the word "number."[19] It showed how many problems can be avoided if questions that have meaning only for integers are not asked about irrational numbers, or concepts that are used in the

development of real numbers are not applied unthinkingly to complex or transfinite numbers. The posthumous publication of Wittgenstein's *Philosophical Investigations* in 1953 made it clear that the philosophy of science must take into account the fine texture and diversity of language use, and be aware of the dangers of assuming an unproblematic correspondence between language and reality.

Feyerabend's historical studies have led him to conclude that theories are established by propaganda, persuasion and ideology.

One of Wittgenstein's students, N.R. Hanson, began applying this lesson to science by a process of historical analysis of scientific laws.[20] Hanson found that Newton's laws of motion had been put to a wide variety of uses. For example, the second law was used as a formula to calculate acceleration, as an empirical generalization, as a definition of force, and as a rule for measuring forces. In each of these diverse uses, the meaning of the law depended on a system of statements that showed how the law was used. He argued that observation reports are shaped in these different uses by the conceptual scheme of the observer, and thus are "theory-laden." Since there is no theoretically neutral observation language, the goal of an empirical account independent of theoretical concepts is doomed to failure. This, however, was just the beginning of the historical-conceptual attack on autonomous science.

Publication in 1962 of Thomas Kuhn's analysis of scientific revolutions marked the next stage of the revolt against the idealizations of logical empiricism.[21] Kuhn distinguished between "normal" science during periods when a paradigm is widely accepted as a model or ideal of explanation, and periods of revolution when there is no agreement between competing paradigms. Such paradigms determine the kinds of problems scientists are interested in, as well as their standards for solving those problems and the very nature of the facts which are considered relevant. A revolution does not involve purely logical steps, but is at least partly a matter of personal or group commitment to a new pattern or perspective. Kuhn's study of historical revolutions tried to reveal science as it actually was rather than as it should be, showing its dependence on psychological, sociological and logical factors.

Extending Kuhn's historical approach, Stephen Toulmin rejects the distinction between normal and revolutionary science with an argument for the continual evolution of concepts.[22] Because of these constantly shifting concepts in the development of science there can be no foundational propositions at all. Kuhn's normal science could yield to logicalist analysis, but for Toulmin there is no conceptual stability available for the application of logical criteria. The context of discovery in the process of theory changes cannot be isolated from the context of justification, which had been the basis for the logical analysis of scientific theories.

The Kuhnian attack on autonomous science revealed the conceptual and contextual aspects of science, suggesting possibilities of a closer relationship between science and other cultural expressions. It is tempting to see the emphasis on personal and communal commitment to concepts in science as analogous to a community of faith in religion. However, some caution is advisable due to the tendency toward subjectivity and relativism in Kuhn's approach. Recent developments in the philosophy of science have either emphasized these tendencies or attempted to avoid them.[23] The corresponding implications for relating science and faith will be explored next.

A balanced approach to science must include both logical inference and rational interpretation.

Alternatives to Autonomous Science

The demise of autonomous science has opened up new possibilities for understanding science within a wider context of ideas and world views. A radical departure is suggested by Paul Feyerabend[24], who urges a pluralism in which no single theory should ever be allowed to stand by itself as the ideal of normal science. Since no one theory can ever account for all of the facts, competing alternatives must be permitted so that all possibilities can be tested. Furthermore, there is no neutral set of observation statements by which mutually incompatible theories can be logically compared. The adoption of a particular theory alters the meaning of the facts to be accounted for, so that competing theories are incommensurable with one another. Feyerabend's historical studies have led him to conclude that theories are established by propaganda, persuasion, and ideology. Order is subjectively imposed

on selected data, rather than objectively determined by empirical and logical methods.

Feyerbend's radical subjectivism suggests a nearly total integration of science and culture. A similar relationship between science and Christian faith seems to apply to the presuppositional theology of Cornelius Van Til. He advocated that all thought should be based on Christian presuppositions, and thus be shaped by them.[25] However, depending on how such presuppositions are interpreted and applied, it would appear that Christian and secular versions of science would be incommensurable, with no common basis for agreement. This seems to be the case in contemporary scientific creationism with its emphasis on flood geology for belief in a young earth[26], contrary to the standard scientific interpretation of a vast body of empirical data.[27]

Christian influence is most clearly seen in the doctrine of creation, which emphasizes the objective order of nature and its rational intelligibility for human beings as created in the image of God and given responsibility for creation.

Feyerabend's subjective approach encourages a pluralism of competing scientific ideas. It places a healthy emphasis on creativity and diversity, but appears to replace foundationalist autonomy with relativism and anarchy. What seems to be needed is some alternative between these extremes that can retain a measure of objectivity and rationality for science without renewing its isolation or totalitarian claims. A balanced approach to science must include both logical inference and rational interpretation. The relations between evidence and hypotheses must be guided by logical procedural criteria. However, science cannot be limited to the coercive rules of deductive logic. Inductive generalizations are also frequently required, especially in experimental work, and these involve many ingenious logical techniques. Also needed are retroductive (hypothetico-deductive) arguments which seek to find explanatory hypotheses that will make the given data more intelligible through their deductive concepts and consequences. Since this broader approach to logicality in science is not restricted to deduction, it allows for the kind of tentativeness and disagreement that is apparent in the history of science without abandoning objective methods and logical criteria.

In addition to these more formal types of inference, science also involves an interpretative dimension which is dependent on a wider context of meaning and structure. Although interpretation is often controversial, it is a part of scientific rationality and cannot be reduced to the kind of logicality that the logical positivists sought in their attempt to isolate science as a noncontroversial autonomous realm of knowledge, distinct from other types of human activity. The category of rationality is especially applicable to conceptual shifts, and even larger revolutions that occur in science, since these often exhibit the highest form of human rationality.

Interpretation enters into every level of scientific activity, beginning with the perception and selection of data that are shaped to some extent by our conceptual system, and extending to the norms of simplicity and fertility that govern inductive and retroductive inferences. The subjective aspects of interpretation do not necessarily eliminate the constraints and corrections of the objective order. Interpretive skills must be learned, as they depend on both the consensus of shared experience developed within a group and sensitivity to related disciplines. Interpretation is guided by such objective norms as correct prediction and a more effective control of nature. Rationality is not independent from logicality, but often utilizes the modes of logical inference in the process of conceptual selection and interpretation.[28]

This emerging historical realism in science suggests the possibility of at least a partial integration of science and religion; somewhere between the total isolation required by logical positivism and the complete integration encouraged by subjectivism, leading to incommensurable views of science. Several authors have argued that Christianity does influence the basic assumptions of science, especially evident during a scientific revolution.[29] This influence is most clearly seen in the doctrine of creation, which emphasizes the objective order of nature and its rational intelligibility for human beings as created in the image of God and

Historical analysis has shown that science is not independent of psychological and sociological factors in its progress.

given responsibility for creation. Thus, the effort to relate science and faith in order to better understand and appreciate both should be a continuing process of Christian stewardship. Although this task may never be complete, a number of lessons and guidelines for pursuing the integration of science and faith have emerged.

Conclusions

Several lessons apply to science itself. Science can no longer be viewed as an autonomous activity independent of other forms of knowledge or superior to them. Scientific certainty appears to be an unattainable goal, and any literal description of nature is a naive hope that must give way to the use of theoretical concepts and models. Scientific knowledge does not progress in a steady cumulative fashion, and cannot be unified into a complete and consistent axiomatic system. Empirical significance and meaning cannot be limited to observational language, but depends on an entire conceptual system including logical relationships and language usage. Historical analysis has shown that science is not independent of psychological and sociological factors in its progress; scientific concepts are subject to change in the process of theory development and competition. Science is thus seen as a creative human activity requiring a wide variety of logical techniques and interpretive skills, and is integrally related to its cultural context.

Although faith in the order, purpose, and reality of God's creation can motivate and inform scientific efforts to understand the world, we can never assume that our knowledge is complete and conclusive.

These lessons offer new possibilities for relating science and Christian faith. Several ideas discussed above can be listed as guidelines for this process:

1. The Christian view of human finiteness and fallibility should remind us that scientific certainty and autonomy are impossible goals, and that the total separation of science from Christian faith is unacceptable and undesirable for both. We should recognize the dependence of science on basic philosophical assumptions and seek to evaluate its results in the light of these assumptions. Progress in science requires a conviction that the world is intelligible and that detailed study of it is valuable. Although faith in the order, purpose, and reality of God's creation can motivate and inform scientific efforts to understand the world, we can never assume that our knowledge is complete and conclusive.

Scientific results can help to correct theological errors, and religious insights can provide new understanding for science.

2. The potential validity of metaphysical and theological explanations, rejected as nonsense by logical positivism, is reaffirmed by the broader criteria of meaning required by science in the use of coherent conceptual systems and theoretical interpretations. Proper evaluation and application of the results of science depend on appropriate theological and ethical considerations. The demands of stewardship require that our knowledge be related to a wider context of meaning and responsibility.
3. That empirical observations and descriptions cannot be completely separated from theoretical interpretations and assumptions raises doubts about the adequacy of complementary explanations in science and religion for avoiding possible conflicts. Perhaps science and religion can benefit from a relationship of mutual interaction and support. Scientific results can help to correct theological errors, and religious insights can provide new understanding for science. For example, medieval theology developed a conviction of the order and intelligibility of creation that supported new scientific efforts, and science eventually contributed to greater empirical emphasis in theology.
4. The dependence of science on historical antecedents and communal commitments parallels the Christian experience of a continuing community of faith, but such a dependence should not give license to a total integration of science with faith and the production of naive scientific views. Both science and religion should be allowed sufficient independence to develop their own ideas and insights. Both should also be seen as creative human activities responding in different but related ways to the mysteries of human experience.
5. The Christian view of an objectively ordered and intelligible creation as a sphere of human dominion and responsibility provides a basis for the objectivity and rationality of science. Such a view can answer the challenge of relativism and subjectivism that

would undermine the relevance of science. Responsible Christian stewardship requires a continuing effort to relate science and faith.

In view of these considerations, science can be seen in its proper place as a cultural activity sharing many of the limitations and uncertainties of other human endeavors. Science can no longer maintain its claim as the ideal for human knowledge and perfection. Stanley Jaki summarizes these conclusions:

> Thus for the Christian the ideal of perfection is tied to the ideal of the perfect man in Christ. That is, a man who searches not for narrow logic but for understanding in its broadest sense which gives justice to the facts of nature as well as to the facts of history, and which satisfies man's senses as well as his innermost aspirations.[30]

In B.F. Skinner's book, *Beyond Freedom and Dignity*[31], C.S. Lewis is criticized for claiming that too much emphasis on science and power over nature leads to dehumanization and to the "abolition of man."[32] Skinner asserts that the abolition of "autonomous man" is long overdue. In his zeal to subject man to scientific control, Skinner fails to recognize recent developments in the history and philosophy of science that have led to the abolition of autonomous science.

REFERENCES

[1]C.P. Snow, *The Two Cultures; and a Second Look*, 2nd ed. (Cambridge: Cambridge University Press, 1964).

[2]Michael Polyani, *Personal Knowledge* (Chicago: University of Chicago Press, 1958).

[3]See, for example, W.R. Thorson, "The Biblical Insights of Michael Polanyi," *Journal of the American Scientific Affiliation* 33(3):129–138; W.R. Thorson, "Scientific Objectivity and the Word of God," *Journal of the American Scientific Affiliation* 36(2):88–97; W.J. Neidhardt, "The Participatory Nature of Modern Science and Judaic-Christian Theism," *Journal of the American Scientific Affiliation* 36(2):98–104.

[4]Ernst Mach, *The Analysis of Sensations* (New York: Dover, 1959).

[5]Gerald Holton, *Thematic Origins of Scientific Thought* (Cambridge, MA: Harvard University Press, 1973), chapter 8.

[6]Loren R. Graham, *Between Science and Values* (New York: Columbia University Press, 1981), p. 39.

[7]L. Wittgenstein, *Tractatus Logico-Philosophicus* (London: Routledge and Kegan Paul, 1922).

[8]A.J. Ayer, *Language, Truth and Logic* (New York: Dover, 1952), p. 108.

[9]See, for example, David L. Dye, *Faith and the Physical World: A Comprehensive View* (Grand Rapids: Eerdmans, 1966); Aldert van der Ziel, *The Natural Sciences and the Christian Message* (Minneapolis: Denison, 1960).

[10]Ernst Mach, *The Principles of Physical Optics* (New York: Dover, 1926), preface.

[11]Niels Bohr, *Atomic Theory and the Description of Nature* (New York: Cambridge University Press, 1933), p. 28.

[12]Mary Hesse, *Forces and Fields* (London: Nelson, 1961), p. 22.

[13]See, for example, Richard H. Bube, *The Human Quest* (Waco, TX: Word Books, 1971); Donald M. McKay, *The Clockwork Image* (Downers Grove: InterVarsity Press, 1974).

[14]Del Ratzsch, *Philosphy of Science: The Natural Sciences in Christian Perspective* (Downers Grove: InterVarsity Press, 1986), pp. 133–37.

[15]Carl Boyer, *A History of Mathematics* (New York: John Wiley, 1968), p. 656.

[16]Friedrich Waismann, *Introduction to Mathematical Thinking* (New York: Harper and Brothers, 1959), p. 105.

[17]J.C. Whitcomb and H.M. Morris, *The Genesis Flood* (Philadelphia: Presbyterian and Reformed Press, 1961).

[18]Wittgenstein, *Tractatus*, proposition 6.342.

[19]Waismann, *op.cit.*

[20]N.R. Hanson, *Patterns of Discovery* (Cambridge: Cambridge University Press, 1958).

[21]Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962).

[22]S. Toulmin, "Does the Distinction between Normal and Revolutionary Science Hold Water?" in *Criticism and the Growth of Knowledge*, I. Lakatos and A. Musgrave (eds.), (London: Cambridge University Press, 1970), pp. 25–47.

[23]Frederick Suppe, *The Structure of Scientific Theories*, 2nd ed. (Chicago: University of Illinois Press, 1977); Dudley Shapere, *Reason and the Search for Knowledge* (Boston: D. Reidel, 1984).

[24]Paul Feyerabend, "Consolations for the Specialist," in *Criticism and the Growth of Knowledge*, pp. 197–230.

[25]C. Van Til, *A Christian Theory of Knowledge* (Philadelphia: Presbyterian and Reformed, 1969); R.L. Reymond, *The Justification of Knowledge* (Philadelphia: Presbyterian and Reformed, 1976).

[26]J.C. Whitcomb and H.M. Morris, *op. cit.*.

[27]Davis A. Young, *Christianity and the Age of the Earth* (Grand Rapids: Zondervan, 1982).

[28]Ernan McMullin, "Logicality and Rationality: A Comment on Toulmin's Theory of Science," *Boston Studies in the Philosophy of Science*, vol. 11, R. Cohen and M. Wartofsky (eds.), (Dordrecht: Reidel, 1974), pp. 209–224.

[29]See, for example, R. Hooykaas, *Religion and the Rise of Modern Science* (Grand Rapids: Eerdmans, 1972); E.M. Klaaren, *Religious Origins of Modern Science* (Grand Rapids: Eerdmans, 1977).

[30]Stanley L. Jaki, *Science and Creation* (Edinburgh: Scottish Academic Press, 1974).

[31]B.F. Skinner, *Beyond Freedom and Dignity* (New York: Bantam Books, 1971), p. 191.

[32]C.S. Lewis, *The Abolition of Man* (New York: Macmillan, 1974).

Three Models of Making: Prime Mover, Craftsman and King—Alternate Theistic Frameworks for Teaching Origins

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Each model of alternate Theistic frameworks has ancient roots, has played a significant role in the secular and religious response to Charles Darwin, and is still involved in today's evolution/creation debate. When someone says that they teach or theorize in a "Theistic" framework, it is critical to distinguish which model they mean.

Four issues are considered from each viewpoint: mutation, natural selection, species stasis, and species change. The same concept looks very different when presented within a different world view.

The distinctions of Charles Hodge (1874) are used to define "evolution" and the concept that God might act creatively through an evolutionary process is evaluated. The conclusion is that the continuing soverignty of God in the natural world is the major issue.

Ideas vs. World Views in Teaching: An Introduction

In an era of conflict, nothing is more likely, and yet nothing is more dangerous, than fighting the wrong battles at the wrong time and in defense of the wrong ground. Like the men of Ai, we line up our ranks, armed to the teeth, ready to fight to the death over some soggy patch of peripheral issue, and, unaware, we concede our stronghold. In no area can that tactical error be more clearly demonstrated than in the evolution/creation controversy. In what sense can it be possible to talk (in the classroom or in the lab) about scientific issues, and leave the philosophical questions for some other forum?

It simply is not true to say that in teaching, or in theorizing, we can objectively present the observations and theories of an area of science and leave the larger

issues to settle themselves outside the classroom (or the laboratory). Those larger issues, in the form of models of reality (epistemes, paradigms, world view assumptions), are an intrinsic part of every lecture, of every explanation. Something is wrong with a definition of "objectivity" which leaves out world view assumptions—they are not gone, just hidden. That sort of objectivity is hard to distinguish from dishonesty. Most of the controversies we see in faith/science issues involve conflicts between such hidden or forgotton world view assumptions.

The choice of data, the organization of the concepts, the sort of implications discussed, will all reflect the presenter's world view, and, often, the world views of the individual who first developed the idea.

The relationship between world views and scientific ideas (theories) has two aspects. First, every description or explanation of phenomena points outside itself. The choice of data, the organization of the concepts, the sort of implications discussed, will all reflect the presenter's world view, and, often, the world views of the individual who first developed the idea. If the presenter does not "objectively" mention his or her perspective, it becomes even *more* persuasive, because a listener will perceive these occult assumptions as *givens*, as self-evident truths.

On the other hand, every idea presented is reshaped by the world view of the person using it. It's true that the same general concept may be explained by, or made to fit into, a variety of different world view frameworks. This does not mean that the transplanted concept will remain unchanged. Hence, a transplanted concept or theory is a *new* idea, analogous to the original, but yet essentially different. In fact, if a transplanted concept has not changed it has not been *transplanted*, but instead it has partially *supplanted* the new user's world view with that of someone else (Kuhn, 1962; Olthius, 1985; Livingstone, 1983).

Although considerable differences exist among the world views of those who call themselves Christians, they would all claim to be "theistic." But, what do they mean by that term? In this paper I explore the differences between three major models of reality with ancient Christian historical traditions, and their current relevance in today's "creation wars." One of these will correspond best with the accepted definition of the term "Theistic," but due to the confusion in present usage I will not insist on that definition until the end of the paper.

Three Models of Making: An Analytical Framework

The most widely held Christian viewpoint of God and Nature during the last 2000 years arose from the injection of Greek dualism into Medieval theology. In Greek Dualism there are two eternal principles: Divine Reason, which produces law (order) for the universe, and chaotic (lawless) Matter. In this model of reality with God as the "Prime Mover," the eternal Divine Reason (God) produces ruling metaphysical entities of various sorts; i.e., ideals, final causes, the life force, *et cetera*. These entities then force the order of their principle upon an essentially chaotic and rebellious nature. Variants in the Prime Mover model reflect the views of different Greek philosophers, particularly Plato and Aristotle. Neoplatonism sees the universe as static, continuously returned to the "norm" by autonomous metaphysical "ideal forms." The Aristotelian viewpoint, on the other hand, considers the universe to be in process, moving toward a reality defined by a

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metaphysical set of "final causes" or goals, which are continuously drawing reality onward (and upward) (Klaaren, 1977).

The second model, God as a "Craftsman," became popular during the Renaissance, and especially during the Enlightenment within Logical Positivism. Its view of the basis of nature is (with modification) the view of Democritus, who held that all of reality is composed of colliding and interacting atoms. Nature is considered to be an autonomous realm with its own intrinsic laws and processes. The Christian variant accepts that view of nature for the present order, but points out the necessity of a beginning, and hence, a beginner. The Deity, in analogy with a human artisan, is viewed as the wise craftsman who made and wound that intricate clock, the universe. At the time of creation, the Divine Craftsman (artifactor) placed within Nature (artifact) a principle of autonomous existence, assorted "natural" laws and nature's initial state and motion, and then He left it ticking away. Holders of the Craftsman position differ both on the degree to which the clock is considered to be still open to actions of the clockmaker, and on the comprehensiveness of the Craftsman's initial plans (Klaaren, 1977).

Variants in the "Prime Mover" model reflect the views of different Greek philosophers, particularly Plato and Aristotle.

The third model is based on the concept of a ruler and his obedient subjects. In this "King" model, God is the only central reality: calling the universe into existence, sustaining it and directing it, by the "Word of His Power," His Royal command (fiat). This model directly reflects the viewpoint of the Hebrew writers of the Scriptures, and takes quite literally the numerous biblical statements of the relationship between God and His creation, nature. (The other two sorts of models would interpret such statements metaphorically.) The implications of seeing God as King are: first, that nature is totally contingent upon God's will for its structure and continued existence; second, that nature is completely obedient to that will; and third, that all events in the natural world are precisely planned and presently controlled by God (Klaaren, 1977).

Historically, this viewpoint has been broadly represented in Christian theology, including Augustinian thought, Medieval Nominalism, and Reformed theology in general. At first glance, the modern mind would probably assume that this viewpoint rules out natural law and causal relationships, but that assumption is a function of modern "socialization." An older formulation (The Westminster Confession of Faith) makes this clear:

> God, from all eternity, did, by the most wise and holy counsel of his own will, freely, and unchangeably ordain whatsoever comes to pass: yet so, as thereby neither is God the author of sin, nor is violence offered to the will of the creatures; *nor is the liberty or contingency of second causes taken away, but rather established.* (Chapter III, article 1, emphasis mine.) (Also see Chapter V.)

In fact, a strong case has been made for this viewpoint being the catalyst which produced the phenomenon we call "modern science." If the universe is totally obedient to the will of God, we must look at it to see what He has done rather than trying to deduce its structure from logic (Hooykaas, 1972; Hummel, 1986; Klaaren, 1977).

In the next section, we will analyze four specific biological issues involved in the evolution/creation debates of today, looking at each issue through the spectacles of each of the three models. Following that background discussion, in the last portion of the paper we will look back to the nineteenth century Princeton theologian Charles Hodge for specific definitions of the terms "evolution" and "Darwinism." The distinctions which Hodge drew in his day are equally valid today, and have the advantage of not being a product of the present conflict. Using those definitions, we will analyze the meaning of "theistic evolution" from the viewpoint of each of the three models of making.

The Deity [a "Craftsman"], in analogy with a human artisan, is viewed as the wise craftsman who made and wound that intricate clock, the universe.

Four Issues: Biological Concepts

"Random" Events—The Role of Mutation

In the Prime Mover model, a random change of genetic material, or indeed any sort of random event, is seen as a wholly typical product of the chaos which underlies reality. Such an event is an act of *rebellion* against the constraining laws of Eternal Reason, a

challenge to order or progress, and hence damaging and intrinsically useless. Random events will need to be removed (cleansed away) in order to retain structure or create progress.

[The "King"] model directly reflects the viewpoint of the Hebrew writers of the Scriptures, and takes quite literally the numerous biblical statements of the relationship between God and His creation, nature.

The Craftsman theorist will view random events as unpredictable products of, or the complex autonomous causal structure of, reality. They might have been specifically planned, with the timing programmed in at initiation (the design concept—a "Minnesota Fats" model of God), or they might be the unexpected expression of possibilities built in at initiation (the potentials concept—God as a surprised observer). Benefits of mutations presumably would exist if programmed, but rarely if only as a potential. Such events could also randomly set the direction for future development by other forces.

The concept that God is King over all natural events naturally includes mutations. Although unpredictable by us, they are still completely obedient responses of nature to God's providential commands, part of what He is doing as He builds His kingdom. "The lot is cast into the lap, but its every decision is from the LORD" (Proverbs 16:33). Mutations may or may not appear to be of utility to human observers, but that is not surprising. We do not often know the mind and purposes of God.

As a person teaches about mutations and other "random" events, therefore, the interpretation placed on them—rebellion, happenstance, or unexpected obedience—will imply one of the three models of making.

Natural Selection

Natural selection, or differential mortality and fertility due to natural causes, is a rather irrelevent irritant to the Prime Mover theorist. In one form or another, natural selection implies that physical (natural) causes can act as agents to produce or maintain some degree of biological order. In the Prime Mover world view, however, order is a function of *metaphysical* entities or forces, and the physical world itself can fundamentally produce only *disorder*. Natural selection as an *ordering* process must therefore be rejected or relegated to a secondary adjustment role, secondary to the "real" forces, ideals, final causes, *et cetera*. Significantly, this position dominated biological thought during the last half of the nineteenth century. People like Cope and Marsh rejected Darwin's mechanism of change (ordering), instead accepting a Neo-Lamarckian evolutionary process (Moore, 1979).

For the Craftsman thinker, natural selection is the imprint of, or the complex autonomous causal structure of, *real* reality—the physical universe. Such physical constraints could include both environmental conditions and genetic developmental patterns. As mentioned in the consideration of random events, selective change might have been planned (design concept) or unplanned (potentials concept). In either case, natural selection is viewed as nature *autonomously* ordering itself, according to its initial state and laws. This world view, therefore, views natural selection as a major source of order at the present time; whether that order is static retention or dynamic change, programmed or undesigned.

As a person teaches about mutations and other "random" events, therefore, the interpretation placed on them . . . will imply one of the three models of making.

If God is King over the natural order, all events will be obedient responses of the creation (nature) to His commands. Natural forces are obedient servants, including the natural pressures of environment and developmental pattern. Births and deaths work out God's will for the world of life, whether He wills change or stability. "The earth is full of your creatures . . . these all look to you to give them their food at the proper time . . . when you take away their breath, they die and return to the dust. When you send your Spirit, they are created. . . . " (Psalm 101:24, 27, 29, 30). If God is King, therefore, natural selection will literally be *supernatural* selection, in which God's hand of Providence works His free and exact will for each living thing.

Again, the way one presents *natural* selection proclaims one's view of *nature*—a rebellious chaos, an

autonomous clock, or an obedient creature—and, therefore, it teaches a world view.

Species Stasis

Species stasis is the concept that species (or perhaps some larger taxonomic unit) are stable, constrained in some fashion at the present to a sort of morphological locus or ideal form (Stanley, 1979). This concept has been held in one form or another within each of the three models. Species stasis is attributed by Prime Mover theorists to the pressure on chaotic matter of static metaphysical ideals; entities which, therefore, are the true essence of a species. In this viewpoint, the concept of species stasis is identical to the concept of the *fixity* of species, because metaphysical ideals are inviolable and unchanging. Such ideals counteract any chaotic tendency of the material organism (change). This view of biological species was first explicitly taught, in Christian thought, by Francisco Suarez, a Neoplatonic Jesuit theologian of the Counter-Reformation (Klaaren, 1977).

Neoplatonic views dominated biology before 1860, with the "archetype" concept providing a strong stimulus in the development of comparative anatomy. One unusual and unfamiliar feature of this view was the thought that permanent extinction was impossible. The metaphysical ideal would bring the species into existence again, possibly by using other existing species. This may have been the basis of Cuvier's views of multiple catastrophes and re-creations by types (Moore, 1979). It makes sense if the metaphysical is the essence; the most real thing about a species.

The way one presents natural *selection proclaims one's view of* nature*—a rebellious chaos, an autonomous clock, or an obedient creature—and, therefore, it teaches a world view.*

Within the Craftsman model, species stasis must be due to *physical* limits to change. Such physical constraints are certainly not metaphysical ideals. However, for species stasis to occur, *something* must function in a fashion analogous to the Platonic metaphysical ideal. In some fashion, a Craftsman theorist would maintain, a species' (or a larger group's) ideal structure must be built in—presumably on its DNA. That material pattern must control any tendency to change, implying the presence of autonomous cybernetic systems which will maintain the preprogrammed ideal species standards (on DNA). Such a system could be ecosystem-based (stabilizing selection), or it could be a set of developmental constraints; i.e., internal physio/genetic mechanisms. The Craftsman view of stasis has, therefore, developed the concept of a materially encoded analogue to a Platonic ideal.

Such a self-governing (cybernetic) system should be able to remain stable for as long as its referent, the physical ideals structure, remains intact. This may be a long time (10 million years, according to Stanley, 1979), but since this view considers the *species ideal* a *physical* entity, that ideal itself will be subject to unplanned changes from the rest of autonomous physical universe.

Species stasis does not pave a "Royal Road" to Christian Theism, but instead points to one's view of ideal forms.

By logical necessity, a material ideal could be mutated. When that occurs, the stasis mechanism itself would act to enforce change. In the end then, since such a material ideals structure is part of an autonomous universe, it is vulnerable.

If God be King, species' stasis is their obedience. That is, God chooses to have no change in a particular group of organisms. He therefore acts providentially through all natural events—mutation, births, deaths, developmental constraints, natural catastrophes, or happenstance—producing stasis. He commands and nature obeys. Stasis has a spiritual source. King modelers have suggested that species may represent permanent choices which God made back before time began; i.e., some sort of divine mental constructs that will act in a fashion equivalent to Platonic ideals, a view held by the Medieval "idealist" school. King modelers state that, in any case, the stasis of a present species represents God's present will for that species; a choice which God remains free to change at any time, since He is not constrained by physical reality.

Clearly then, species stasis does not pave a "Royal Road" to Christian Theism, but instead points to one's view of ideal forms. Such forms may be viewed as metaphysical, as material, or as spiritual patterns, and may be thought to have any degree of autonomy from the will of God. Species stasis can therefore point anywhere.

Species Change

The concept that species change has been held by individuals from each of the three models of making. Individuals with the Prime Mover assumption often view species as the present manifestation of some sort of a metaphysical progressive "life force." Such a force would be drawing specific lineages into greater order, toward a final goal. As mentioned before, this view dominated late nineteenth century biology (Moore, 1979).

A Craftsman thinker who accepts species change has two possible viewpoints. Perhaps changes were programmed in by the Deity at the beginning, just as a developing animal changes through a series of morphological stages stored in its genes. The created program is now autonomous, unrolling toward its end. Secondly, change might be attributed to unplanned environmental input of a selective or a random nature. Perhaps God put in the potentials, but their expression is happenstance. Such views have been well stated many times; for instance:

> There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been made, and are being evolved. (Darwin, 1859.)

In either case, the Craftsman concept of species change will sound familiar, since it is a close logical analogue to the *non*-deistic concepts of the Logical Positivists which have dominated the thought of twentieth century biology.

In teaching that species change, one may imply that God is presently unnecessary . . . or, one may imply that observed changes demonstrate God's Providence and purposes at work.

If God be King, species' changes are their obedience. That is, God chooses to have change in a particular group of organisms. He therefore acts providentially through all natural events—mutation, births, deaths, developmental constraints, natural catastrophes, or happenstance—producing change. He commands and nature obeys. Change has a spiritual source. King modelers have suggested that species change may simply be a way that God can create a new biological entity, that such change is Divine Providence at work, and reveals plans which God made back before time began (Warfield, 1915). They state that, in any case, present change in a species represents God's present will for that biological lineage; a choice which God remains free to change at any time, since He is not constrained by physical reality.

In Hodge's opinion, Darwin's real problem, his basic error, was his rejection of design. . . . For Darwin, God could not use natural selection because God did not affect nature.

In teaching that species change, one may therefore imply that God is presently unnecessary, either because He built a metaphysical "progress" principle into the universe, or because present changes just unroll life's programmed potentials (as created by God); or instead, one may imply that observed changes demonstrate God's Providence and purposes at work.

An Analysis of Theistic Evolution

Charles Hodge—Analysis and Definition

In moving to the analysis of a more complex concept, careful definitions are critical. I have suggested elsewhere that Theistic Evolution is used by many as a sort of conceptual trash can for the disposal of awkward viewpoints that don't fit their pigeon holes (Wilcox, 1986). "Theistic," I shall temporarily expand to mean one or all of the three models of making being used in this paper. "Evolution," however, must needs have a narrow definition, or analysis will be impossible. To obtain such a definition, I will go back 100-plus years to possibly the greatest of Darwin's theological opponents, Charles Hodge of Princeton Seminary.

In his 1874 analysis of Charles Darwin's theory, *What is Darwinism?*, Hodge identified three aspects to Darwin's thought: Evolution, Natural Selection, and the Exclusion of Design. To allow him to speak for himself:

> From what has been said, it appears that Darwinism includes three distinct elements. First evolution, or the assumption that all organic forms, vegetable and animal, have been evolved or developed from one, or a few, primordial living germs; second, that this evolution has been effected by natural selection, or the survival of the fittest; and third, and by far the most important and only distinctive element of his theory, that this natural

selection is without design, being conducted by unintelligent physical causes. Neither the first nor the second of these elements constitute Darwinism; nor do the two combined. . . . It is however neither evolution nor natural selection which give Darwinism its peculiar character and importance. It is that Darwin rejects all teleology, or the doctrine of final causes. He denies design in any of the organisms in the vegetable or animal world. (Hodge, 1874.)

Most popular ideas of [the last 250 years] reflect the progress myth, (including Marxism, Capitalism, Fascism, and even the Wagnerian operas). In fact, this myth has been so pervasive that most people consider it a self-evident truth.

This paragraph has several important implications. First, the three aspects of Darwin's thinking *can* be separated. *Evolution*, Hodge said, meant the descent of all modern forms from common ancestors. *Natural Selection*, on the other hand, was Darwin's theory of mechanism *for* evolution. *Neither* of them, he said, was Darwinism! *Darwinism* Hodge defined as the world view assumption that there is no design; i.e., no action of God anywhere in nature. In Hodge's opinion, Darwin's real problem, his basic error, was his rejection of design. Hodge pointed out that Darwin uses the word "natural" as antithetical to "supernatural," as well as to "artificial," and therefore excludes the concept of "supernatural selection" (Hodge's term). For Darwin, God could not use natural selection, because God did not affect nature. When Charles Hodge rejected Darwinism, therefore, he was rejecting Darwin's *world view*, the idea that nature is autonomous in its operation. That is what Hodge meant by his often-quoted concluding sentence. Here, in context, is that sentence:

Dr. [Asa] Gray goes further. "If Mr. Darwin believes that the events which he supposes to have occurred . . . were undirected and undesigned . . . no argument is needed to show that such a belief is atheistic." We have thus arrived at the answer to our question, *What is Darwinism? It is Atheism.* This does not mean, as before said that Mr. Darwin himself and all who adopt his views are atheists; but it means that his theory is atheistic; that the exclusion of design from nature is, as Dr. Gray says, tantamount to atheism. (Hodge, 1874, emphasis mine.)

So then, evolution can be considered as a biological idea without accepting Darwin's world view. That includes even "macro-evolution," which is obviously what Hodge meant by the term. I am not implying that Hodge had accepted evolution. He had not. He did, nevertheless, allow for the *possibility* that some might accept both biological evolution and the Scriptures at the same time.

The words "evolution" and "Darwinism" are so often in this country, but not in Europe, used interchangeably, that it is conceivable that Dr. Peabody could retain his faith in God, and yet admit the doctrine of evolution. But it is not conceivable that any man should adopt the main element of Mr. Darwin's theory, viz., the denial of all final causes, and the assertion that since the first creation of matter and life, God has left the universe to the control of unintelligent physical causes, so that all that has ever happened on earth is due to physical force, and yet retain his faith in Christ. On that theory, there have been no supernatural revelation, no miracles; Christ is not risen, and we are yet in our sins . . . (Hodge, 1874.)

Following Hodge, I shall define evolution *not* as "Darwinism," the idea that the universe is without design or designer, but simply as the biological concept that several species may be descended from a common ancestor with modification—whatever causative mechanisms may be involved. The theological meanings which the word typically carries will be considered in the following section, using the same analytical framework—the three models of making.

"Theistic" Evolution?

In today's debates, the idea of evolution as the descent of many species from a common ancestor has often been identified not as a biological concept, but as a world view which leaves out God completely. Many men, past and present, who have accepted evolution in Hodge's sense of the word, have thought otherwise. However, their views on how God is involved have varied considerably along the lines we have been exploring. Individuals with a Prime Mover world view have usually viewed evolution as the biological product of a general metaphysical progress principle which guides all reality toward some final goal or state; the "Omega point," perhaps.

A Prime Mover version of evolution might be more accurately termed Metaphysical *Evolution, since it is based on the Neoplatonic or Aristotelian world view.*

The progress myth, which grew from an Aristotelean concept of reality during the Enlightenment, has probably been the most culturally active assumption in the Western world during the last 250 years (Lewis, 1967; Livingstone, 1983). For instance, Condorcet (1793) proposed that man was moving from savagery to

perfection in ten stages (Moore, 1979). Most popular ideas of that period reflect the progress myth (including Marxism, Capitalism, Fascism, and even the Wagnerian operas). In fact, this myth has been so pervasive, that most people consider it a self-evident truth. The myth strongly shaped the popular understanding of Darwin's theory, producing adulation for his "scientific proof" of progress (which he didn't try to prove), but neglect of his specific theory of biological change—natural selection. Both science (Cope, Marsh, *et cetera*) and religion (Drummond, Abbott, *et cetera*) equated evolution with progress and made this myth central to their enterprises, producing "Neo-Lamarckian science" and "classical liberal" Christianity (Moore, 1979). Such a Prime Mover version of evolution might be more accurately termed *Metaphysical* Evolution, since it is based on the Neoplatonic or Aristotelian world view.

Craftsman versions of Theistic Evolution would be better termed forms of Deistic *Evolution, since they are based on variants of the Deistic world view.*

Craftsman theorists consider evolution to be due to an extensive degree of either programmed or unprogrammed biological change. In either case, the process is considered presently to be autonomous and unguided. Goals depend upon the initial program, and progress is limited by that program's possible complexity and by the programmer's level of insight. If one assumes an omniscient God, that's a lot. On the other hand, it may all be a bit of a surprise to Him as well (potentials concept). Randomness either is a problem for the Deity's initial program, or it is an autonomous machine which he made for producing change. If the Deity wasn't too good at it, He might occasionally need to return and add other programming—i.e., the God of the Gaps. Craftsman versions of Theistic Evolution would be better termed forms of *Deistic* Evolution, since they are based on variants of the Deistic world view (Wilcox, 1986).

If God is perceived as a ruling King, biological evolution, in common with all other historical processes, would be a planned and directed process—from good to good—and a part of God building His kingdom. Progress would be due to God having a goal, a plan to which He calls the natural order in totally

The Divine Craftsman, is not the God of the Scriptures.

obedient service. This is the only view which is really a *Theistic* Evolution, one which makes biological evolution subservient to the world view (and the Sovereign God) of Biblical Theism. B.B. Warfield, Hodge's successor, pointed out that dispute would continue "... until it is thoroughly understood in all quarters that 'evolution' cannot act as a substitute for creation, but at best can supply only a theory of the method of the divine providence" (Warfield, 1911).

So, one can teach biological evolution and point students away from God to an autonomous material natural order or to metaphysical forces and forms. Alternatively, one can point through evolution to the Sovereign God, ruler of nature and Lord of history, who is working out His will in every "natural" event. But then again, one might also be pointing students toward or away from the Sovereign God as one teaches that evolution does *not* occur.

Conclusion: Questions

Has this debate not been polarized in recent years into an argument between two of the options of the Craftsman model? We admit the autonomy of the machine, but we continue to argue about who made it. By doing that, we already conceded the critical question, we have given up God's sovereignty. The real war exists between world views and their assumptions—the autonomy of nature versus its creaturehood. The significance of *Archaeopteryx* is only a skirmish.

The most critical question is: Are our models of God a response to His revelation of Himself in the Scriptures, or have our biblical interpretations become functions of our a priori *models of God?*

God *could* create by directed processes, and He *could* create by a series of *ex nihilo* miracles. Obviously, if we deny His directive, meaningful, rulership of all natural events, all we have left is *ex nihilo* Divine

action. For two hundred years, Christians within (and outside of) science have been tempted to drop "the God of all Providence" in favor of "the Divine Craftsman." It has seemed more "scientific" in the material universe of the Logical Positivists to consider nature autonomous in its operation. And besides, we still have the God who made it all, don't we? But *that* God, the Divine Craftsman, is not the God of the Scriptures.

Does God ever relegate His sovereignty to autonomous secondary agencies? Can the clay constrain the Potter, or does He retain the right and power to make what He wills out of it? Once God makes a species, is He stuck with it? The most critical question is: Are our models of God a response to His revelation of Himself in the Scriptures, or have our biblical interpretations become functions of our *a priori* models of God? Do we try to squeeze God into the Deist's box because we fear He might act in an inappropriate manner if we let Him continue to putter around with the world? But, what if He won't be squeezed? He isn't a "*tame* lion"!

* * * * *

King of Nature/King of Man

He is the image of the invisible God, the firstborn over all creation. For by him all things were created: things in heaven and things on earth . . . all things were created by him and for him. He is before all things, and in him all things hold together. (Colossians 1:15–17) . . . whom he appointed heir of all things, and through whom he made the universe. The Son is the radiance of God's glory and the exact representation of his being, sustaining all things by his powerful word. (Hebrews 1:2–3) And he made known to us the mystery of his will according to his good pleasure, which he purposed in Christ . . . in him we were also chosen, having been predestined according to the plan of him who works out everything in conformity with the purpose of his will. . . . (Ephesians 1:9, 11) . . . Not one [sparrow] . . . will fall to the ground apart from the will of your father. (Matthew 10:29)

REFERENCES

Darwin, C. 1859. *The Origin of Species*. New York: Random House (reprint).

Hodge, C. 1874. *What is Darwinism?* New York: Scribners, Armstrong and Co.

Hooykaas, R. 1972. *Religion and the Rise of Modern Science*. Grand Rapids: Eerdmans.

Hummel, C. 1986. *The Galileo Connection* Downers Grove: InterVarsity Press.

Klaaren, E.M. 1977. *Religious Origins of Modern Science*. Grand Rapids: Eerdmans.

Kuhn, T.S. 1962. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

Lewis, C.S. 1967. "The Funeral of a Great Myth," in *Christian Reflections*. Grand Rapids: Eerdmans.

Livingstone, D.N. 1983. "Evolution as Myth and Metaphor." *Christian Scholars Review*. 12:111–125.

Moore, J.R. 1979. *The Post-Darwinian Controversies*. Cambridge, England: Cambridge University Press.

Olthius, J.H. 1985. "On Worldviews." *Christian Scholars Review*. 14:153–164.

Stanley, S.M. 1979. *Macroevolution: Pattern and Process*. San Francisco: W.H. Freeman.

Warfield, B.B. 1911. "On the Antiquity and the Unity of the Human Race." *The Princeton Theological Review*. 9:1–25.

Warfield, B.B. 1915. "Calvin's Doctrine of the Creation." *The Princeton Theological Review*. 13:190–255.

The Westminster Standards. Philadelphia: Great Commission Publications.

Wilcox, D.L. 1986. "A Taxonomy of Creation." *Journal of the American Scientific Affiliation*. 38(4):244–250.

The Paradox of Mediated Creation *Ex Nihilo*

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God's work in creation is both "out of nothing" and mediated. The present paper points out the importance of keeping those two aspects of creation together. We consider the significance of these two aspects of creation for God's creative activity in the present, the past, and the future, and conclude with reflection on the meaning of creation.

Introduction

Two fundamental ideas about God's creative work stand in paradoxical tension. My intent here is not to resolve that paradox, because such paradox (which must not be confused with the result of thinking too shallowly to resolve contradiction) seems to be an intrinsic part of Christian theology. The goal here is rather to highlight the basic ideas of creation out of nothing and the mediated character of the divine work, and to point out that neither can be safely ignored. This should help to clarify the domains of responsibility of Christian theology and natural science.

Creation *ex nihilo*, creation out of nothing, means that God called the universe into being entirely by God's power and will, without the cooperation of anything (e.g., pre-existing matter or co-workers) other than God. Furthermore, the universe continues to be sustained entirely by God. Finite being exists entirely because God wishes for it to exist.[1]

The relevance of this aspect of the doctrine of creation thus does not end with creation "in the beginning." In Scripture, there is much more space devoted to God's care for the world and for human beings in history than to the beginning of the universe, though the latter is important biblically. Luther follows this trend in explaining the First Article of the Creed ("I believe in God the Father Almighty, Maker of heaven and earth"):

> I believe that God has made me and all creatures; that He has given me my body and soul, eyes, ears, and all my limbs, my reason, and all my senses, and still preserves them; in addition thereto, clothing and shoes, meat and drink, house and homestead, wife and children, fields, cattle, and all my goods; that He provides me richly and daily with all that I need to support this body and life, protects me from all danger, and guards me and preserves me from all evil; and all this out of pure, fatherly, divine goodness and mercy, without any merit or worthiness in me.[2]

This is creation—creation out of nothing—for it is entirely from God's goodness, and not on account of any cooperation or desert on the part of creatures. But the divine works which Luther singles out are clearly

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not *direct* "creation out of nothing" in the naive sense that God provides food or clothing by making those things appear out of a vacuum. The creative work is *mediated*: food comes from the grocery and the farmer and photosynthesis, through a whole chain of physical and social structures. God's work is usually effected through one physical instrument or another.

This work is entirely that of God, who "justifies the ungodly," "gives life to the dead and calls into existence the things that do not exist" (Romans 4:5, 17). That is a basic biblical tenet. Another basic point of Christian theology, and one which is fundamental for a proper theological understanding of science, is that God created a universe which is "very good" (Genesis 1:31), and thus—among other things—rational (Isaiah 45:18). The universe is accessible to reason. It is possible to understand the rational sequences which lead to the divine works of creation without the necessity of assuming continual divine intervention. If God did not work in this way science would be impossible, and the universe could be understood only on the basis of direct revelation. The fact that science *is* able to give us a partial understanding of the world provides empirical support for the theological assertion of the rationality of the world.

Creation out of nothing, but creation that is mediated. That is the paradox which Christian doctrine sets before us. Let us now consider some examples of God's creative work in more detail in order to see both aspects of creation more clearly.

Healing and the Question of Miracles

Among other concerns of everyday life, the problem of health looms large. Christians look to God for healing, but debate over *how* God heals is sometimes heated. Many newspaper articles could be cited to describe cases in which parents have insisted that a seriously ill child can and should be healed entirely by faith and prayer, while doctors insist that the child's only hope for survival is medical treatment. Such cases often get into the courts, where the issue of religious freedom is raised.

It is helpful to cite here a passage from the old prayer *Hand-Book* of John Stark, a work of German pietism dating from 1728.[3] It includes "Exhortations, Prayers and Hymns for the Afflicted." The exhortation before "The Patient Prays on Taking Medicine" (pp. 297–298) is especially relevant to our present subject:

> If a devout prayer is indispensable even in times of health, how can a patient neglect it, particularly when he takes medicine?
>
> 1. The patient must not despise the physician, nor his medicine, nor think that if he is destined to recover, God can restore him without medicine, and that if he is destined to die, the medicine will be of no avail. No, to think thus were to tempt God. God has not promised to help us without means; and what God has not promised, we cannot ask of him. Those who despise medicine and die, are guilty of their own murder.
>
> 2. Yet he must not set his trust upon the physician and his medicine, but upon God; as it is declared to be one of the sins of King Asa, that in his sickness he did not seek God, but the physicians, and trusted them more than God. 2 Chronicles xvi.12.
>
> 3. Between these two extremes, the patient must select the golden mean. With his lips and his heart he must pray, and take the medicine in firm reliance upon the helping hand of God; then he may know that there is a blessing upon it.

The Christian and the unbeliever may take the same medicine, but one sees the Creator at work in all the natural processes of medical care and the other doesn't. One has faith and the other doesn't, and that is what distinguishes between Christian and non-Christian in such a situation. The Christian need not look to God as an additional cause of healing alongside of, or instead of, doctors, nurses, medicine, radiation, *et cetera*, but sees God at work through those instruments. To despise the medical processes which have been made available in the world, and to think that faith must do without them, is really to despise the goodness of God's creation.

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But can't God heal miraculously? Certainly God can do that—even when all natural possibilities seem to be exhausted. We certainly should not give up on God simply because we see no natural way for healing to occur. (Nor, on the other hand, should we assume that a healing must have been miraculously unmediated simply because we do not at present know natural processes by which it might have been effected.) However, the question being addressed now is not about what God *might* do, but about what God *does* do. It is clear that the vast majority of healings, including those of committed Christians who trust in God for life, take place through natural processes.

It is possible to understand the rational sequences which lead to the divine works of creation without the necessity of assuming continual divine intervention.

There is among some Christians an unfortunate tendency to overemphasize the miraculous, as if only direct interference with the laws of nature could show God at work. It is significant that, in the Gospel of John, Jesus' displays of power—such as the healing of the official's son (John 4:46–54) or the giving of sight to the blind (John 9:1–17)—are called "signs" (*semeia*). It is only faith that will see in any sign, whether miraculous or not, God to whom the sign points. The person who will not believe will not be persuaded (Luke 16:31).

In that connection, it is appropriate to comment here on an article in this journal which has aroused some controversy: Kessel on the Virgin Conception.[4] His basic argument is that there are known biological processes which *might* have made possible the virginal conception of Jesus by natural means. Whether or not the processes addressed in that article could, in fact, have brought about the desired result need not be discussed here. The point is that such an explanation, if in fact scientifically credible, would be completely consistent with the mediated character of God's creative work. That is to be expected, since one of the things that the doctrine of the Virgin Conception does is to point to the one who was thus conceived as the incarnate Creator. One writer of the early church put it this way:

> And, indeed, the altogether peculiar birth of the Lord was of a virgin alone. [This took place] not as if the lawful union [of man and wife] were abominable, but such a kind of birth was fitting to God. For it became the Creator not to make use of the ordinary method of generation, but of one that was singular and strange, as being the Creator.[5]

Creation in the Beginning

We often think of God's work of creating the universe in the beginning as something qualitatively different from what God has been doing since then. "Certainly," we may think, "God is still active today, 'upholding the universe by his word of power' (Hebrews 1:3), providing food and clothing and causing babies to be born through natural processes. But sometime in the past, God did something different. Then God *really* created."

Certainly something happened "in the beginning" which was different from what is happening now. But the fact that God's present work is mediated suggests that we consider the possibility that God's original work of creation was also in some way mediated. That is the direction in which modern scientific cosmology would seem to be taking us. From studying the formation of atomic nuclei in "the first three minutes"[6], it now seems possible to go back, not only to the first fractions of a second of the Big Bang to explain fundamental features of the present universe, but to go back to the very beginning to explain the origin of the mass-energy of the universe.[7] Vilenkin, for example, discusses the quantum tunneling of the universe from "nothing," by which he means "a state with no classical space-time," to a state which evolves as an inflationary universe.[8]

The Christian need not look to God as an additional cause of healing alongside of, or instead of, doctors, nurses, medicine, radiation, etc., *but sees God at work through those instruments.*

(He elaborates on this concept of "nothing" as follows: " 'Nothing' is the realm of unrestrained quantum gravity; it is a rather bizarre state in which all our basic notions of space, time, energy, entropy, etc., lose their meaning."[9] It is clear that this "nothing" cannot simply be identified with the theological *nihil*. The fact that in this state there is nothing corresponding to our classical concepts means that our classically conditioned minds are unable to grasp it, and not that nothing exists in the strict sense.)

A very much oversimplified model can illustrate one aspect of the possibility of creating the material universe out of nothing. In a hybrid Newtonian-relativistic theory we would write the total energy of a system of gravitationally interacting particles in terms of rest energy (mc^2), kinetic energy (**KE**) and potential energy (**PE**) as:

$$E = \sum mc^2 + \sum KE + \sum PE$$

where the first two sums range over all particles, and the third over all pairs of particles. Since the Newtonian gravitational potential energy of two particles is *negative* (being given by $-GMm/R$ for particles with masses **M** and **m** separated by a distance **R** with **G** the gravitational constant), the total energy can be zero even with particles present. One could then visualize a state which began with no particles present (and thus with zero energy), and in which particles were subsequently created. There would not need to be any violation of energy conservation, since the negative potential energy could exactly cancel the rest mass and kinetic energy terms. This merely illustrates that the question "where does the energy come from?" in creation out of nothing can be managed. (Questions about other conserved quantities can also be addressed.[10]) Any model which claims to be even partially realistic must be much more sophisticated. In particular, the process of particle creation can only be described quantum-mechanically, since it is a fundamentally discontinuous process. (See the appendix for further discussion of such processes.)

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Thus, matter itself may have been created in a way mediated by natural processes, since knowable laws of physics would have been valid. In fact, it is the pattern of physical reality described by those created laws which makes possible the creation of matter.

We must reject the purely platonic idea that those patterns exist eternally as platonic forms, and that God creates the universe after that pattern. Such an idea would compromise the doctrine of creation *ex nihilo*, for the forms would then rank equally beside God.

The material world is not an inferior representation of eternal forms, but rather the fulfillment of mathematical pattern.

Rather, we should say that God *created* the pattern of nature, somehow "activating" the particular pattern which God wanted to exist as the physical world. (We are, of course, being forced to use metaphor here.) Our present laws of physics, especially relativity and quantum theory, give us approximations of the true pattern of the universe, that activated pattern which produces the matter of the world.[11] The material world is not an inferior representation of eternal forms, but rather the fulfillment of created mathematical pattern. The term "embodied mathematics" can be used to describe this aspect of the world.[12] This suggests the term "inverted platonism" to describe the Judaeo-Christian understanding that the world which God has created is superior to "bare" mathematical pattern.

The ideas discussed here bring out with great clarity the paradox of which I have spoken. *God is the sole creator, but the whole material world has been produced mediately.*

Concern with creation in the beginning also involves questions surrounding the origin and development of life. Scripture is, if anything, more emphatic about the divine creation of life than of matter (e.g., Psalm 104:29–30). Life comes from God alone, and not from any pre-existing potential for life. Scripture also teaches that God's creation of life is mediated. That is the clear meaning of the first creation account of Genesis, in which God commands the earth and waters to bring forth life (Genesis 1:11, 20, 24). That was the understanding of Christian theologians, such as Gregory of Nyssa, for around a thousand years.[13] The material of which the universe was made, material created by God, was understood to have the potential to develop life when God wished it to.

Such an understanding is completely in accord with modern theories of the origin of life and biological evolution.[14] According to these, the first living molecules gradually came together from non-living ones, and complex organisms developed from simpler ones. There are some serious scientific problems about the origin of life, problems which are still far from solution.[15] But the point here is that the development of life through natural processes is very much in accord with the Christian theological tradition.

The Fulfillment of Creation

God's intention for the future of creation is *shalom*, the peace which is more than mere absence of war (e.g., Isaiah 11:6–9). But how, in the tense and sin-filled situations of this world, can this peace be brought about? Belief in God's *direct* intervention might lead to a "passive pacifim" that rejects any human activity in the establishment of peace. Schall spoke very well to the idea of trusting in God as an *alternative* to armaments:

> This strikes me as rather like refusing to protect a baby who is being attacked because we are pacifists and abhor violence. So the baby dies and we are virtuous. The "trusting in God" alternative is really a denial of secondary causality.[16]

Scripture warns us not to *trust* in weapons (e.g., Psalm 33:13–20, Isaiah 31:1), just as we are not to place ultimate faith in doctors or elevate the evolutionary mechanism of natural selection to the status of a first principle. But God does work mediately also in matters of war and peace. That is part of the meaning of the traditional "just war" doctrine. Part of the task of Christians is the search for instruments more in line with God's peacemaking through the cross of Christ.

We are not to place ultimate faith in doctors or elevate the evolutionary mechanism of natural selection to the status of a first principle.

Tools like effective nonviolent resistance, aikido, or Burnham's proposal for the introduction of U.S. and Soviet observers into one another's strategic systems, need further exploration.[17] One of the significant instruments through which God chooses to work is the human imagination.

The Sense and Meta-Sense of the Universe

The fact that the activity of God within the universe is mediated through natural causes means that we can explain the universe at one level in terms of natural causes. Laplace, in his monumental work on celestial mechanics, made no appeal to divine activity. When he was challenged by Napoleon for not bringing in God, Laplace, who was a Christian, replied, "Sire, I have no need of that hypothesis."[18] On the level of scientific explanation, he was correct. The universe can be explained (in a phrase popularized through Bonhoeffer) *etsi deus non daretur*, "though God were not given."[19] An atheist can make sense of the world.

However, without divine revelation one cannot make sense of the sense that is found in the world. This can be illustrated from a book to which I have already referred, Weinberg's *The First Three Minutes*. After presenting a lucid survey of the tremendous degree of understanding of the universe which science is able to give, Weinberg finally comes to ask what it all means.

If we begin *from the cross and resurrection, we will be able to recognize this "trademark" of God, the sign of* creatio ex nihilo *which is the sign of the cross, throughout the universe.*

And he is forced to answer that it doesn't mean anything: "The more the universe seems comprehensible, the more it also seems pointless."[20] Science by itself cannot avoid that conclusion, for it cannot, from within the realm of natural phenomena, make what we might call "meta-sense" of the sense which scientific methodology sees in the universe. That may, in fact, be a fundamental limitation related to Gödel's theorem.[21]

The Christian claim is that the meta-meaning of the universe is to be found in God's revelation, which is at its fullest in the cross and resurrection of Jesus Christ. That cannot be deduced scientifically, and in that sense is something which must be added on to the scientific understanding of the world. That, however, does not mean that the universe is devoid of witness to this revelation. If we *begin* from the cross and resurrection, we will be able to recognize this "trademark" of God, the sign of *creatio ex nihilo* which is the sign of the cross, throughout the universe.[22] Proper "natural theology" is thus a part of specifically Christian theology.[23] At its best, it is what I have called "chiasmic cosmology," in which Christ is seen "placed crosswise" in the universe.[24] The multitude of death and resurrection types which are seen throughout the world of natural phenomena are then seen to be signs that the Crucified is the One through whom all things were made. On the other hand, the splendor of the galaxies flung across the universe, and the intricate biochemical bases of life, remind us that it is their Creator who is the Crucified. The cross and resurrection of Christ are the meta-sense of the world.

Appendix: The Creation and Annihilation of Particles

The particles of modern physics are not permanent entities. Phenomena like the emission and absorption of light (photons) or beta decay (in which a neutron changes into a proton, an electron, and an anti-neutrino) show that particles can appear and disappear. In quantum field theory, which is currently the most reliable tool for dealing with such phenomena, these processes are described by the use of mathematical objects called "creation and destruction operators." These occur naturally in the mathematical representations of fields, like the electromagnetic field or the Dirac electron field. Creation and destruction operators have the property of, respectively, increasing or decreasing by one the number of field quanta in the state upon which they operate.[25]

A creation operator in quantum field theory does not describe a process which a theologian would call creation *ex nihilo*. Particle interactions must conform to conservation laws for energy and momentum, charge, and other quantities, so that a real particle of energy E can be "created" only if the energy of the rest of the system decreases by E. Still, these processes of emission and absorption of particles (to use terminology somewhat more neutral than "creation and destruction of particles") have some theological interest. According to quantum theory, the structure of the physical world depends on the continual emission, exchange, and absorption of particles. That is to say, the structure of the created world is maintained through a dynamic process which seems like an ongoing death and rebirth. At the very least, this provides theologians with an interesting metaphor!

REFERENCES

[1]Gilkey, Langdon. *Maker of Heaven and Earth*. Garden City, NY: Doubleday, 1959.

[2]Luther, Martin. "The Small Catechism," in *Concordia Triglotta*. St. Louis: Concordia, 1921, p. 543.

[3]Stark, John Frederick. *Daily Hand-Book*. Philadelphia: I. Kohler, 1855.

[4]Kessel, Edward L. "A Proposed Biological Interpretation of the Virgin Birth," *Journal of the American Scientific Affiliation* 35(3):129 (1983).

[5]Pseudo-Ignatius. "The Epistle of Ignatius to Hero," in *The Ante-Nicene Fathers*, vol. 1. Grand Rapids, MI: Eerdmans, 1979 (reprint), p. 114.

[6]Weinberg, Steven. *The First Three Minutes*. New York: Bantam, 1979.

[7]For a popular discussion of recent developments in cosmology see: Barrow, John D. and Joseph Silk. *The Left Hand of Creation*. New York: Basic, 1983.

[8]Vilenkin, Alexander. *Physical Review* D27:2848 (1983).

[9]*Ibid.*, p. 2851.

[10]Asimov, Isaac. *Science, Numbers, and I*. New York: Ace, 1968. (pp. 3–42 give a discussion on a non-technical level.)

[11]Murphy, George L. "A Positive Approach to Creation," *Journal of the American Scientific Affiliation* 32(4):230 (1980).

[12]Olson, Richard. *Scottish Philosophy and British Physics* 1750–1880. Princeton, NJ: Princeton Univ., 1975, especially pp. 299–312. Neidhardt, W. Jim. "Relationship Analogies in Theology and Natural Science," presented at the 1986 annual meeting of the American Scientific Affiliation, 9 August 1986, at Houghton, NY.

[13]Messenger, Ernest C. *Evolution and Theology*. New York: Macmillan, 1932.

[14]Murphy, George L. "A Theological Argument for Evolution," *Journal of the American Scientific Affiliation* 38(1):19 (1986).

[15]Crick, Francis. *Life Itself*. New York: Simon and Schuster, 1981. Thaxton, Charles B., Walter L. Bradley and Roger L. Olsen. *The Mystery of Life's Origin*. New York: Philosophical Library, 1984.

[16]Schall, James V. *National Review* 24:757 (1982).

[17]Reid, Howard and Michael Croucher. *The Fighting Arts*. New York: Simon and Schuster, 1983, especially pp. 194–195. Burnham, James. *National Review* 21:531 (1969). Murphy, George L. "Toward a Theology of Technological War," to be published in *dialog*.

[18]Coulson, C.A. *Science and Christian Belief*. London: Fontana, 1958, pp. 41, 103.

[19]Bonhoeffer, Dietrich. *Letters and Papers from Prison*. London: Fontana, 1959, pp. 120–121. Torrance, Thomas F. *Reality and Scientific Theology*. Edinburgh: Scottish Academic Press, 1985, p. 61, n. 1.

[20]Weinberg, *op. cit.*, p. 144.

[21]Murphy, George L. "A Positive Approach to Creation," *Journal of the American Scientific Affiliation* 32(4):230 (1980).

[22]Murphy, George L. *The Trademark of God*. Wilton, CT: Morehouse-Barlow, 1986.

[23]Torrance, Thomas F. *op. cit.*.

[24]Murphy, George L. "Chiasmic Cosmology," *Journal of the American Scientific Affiliation* 38(2):124 (1986).

[25]See e.g.: Schiff, Leonard I. *Quantum Mechanics*, 2nd. ed. New York: McGraw-Hill, 1955, chapters XIII and XIV or Mandl, F. *Introduction to Quantum Field Theory*. New York: Interscience, 1959.

Communications

THORSON AND BARFIELD: A PHILOSOPHICAL ANALYSIS

Walter R. Thorson, in his article (*JASA*, June 1986), makes use of Owen Barfield's *Saving the Appearances: A Study in Idolatry*.[1] Barfield distinguishes alpha-thinking, thinking about things, from beta-thinking, thinking about thinking. This is an important distinction. A similar distinction was used by Adler in 1965.[2] A related presentation, more sharply drawn and more fruitful, was developed by Broad more than three decades earlier.[3] Both of these writers avoid anything like Barfield's "original participation," a problematic notion discussed uncritically by Thorson. Thorson then illustrates beta-thinking in science by matters that are either not quite scientific or involve distinctions other than those between alpha- and beta-thinking. Finally, he phrases some matters in ways that are likely to produce misunderstanding.

To illustrate the problem with "original participation" let us consider someone caught in a storm at sea. The winds and the waves are the same for the "primitive" as for the "modern" individual. The interpretation may be in terms of the wrath of Poseidon and the rapid passage of Argestes, Boreas, Notus, Zephyrus and their brothers, or in terms of an intense cyclone; that is, as "original participation" or as alpha-thinking, respectively. But does singing "dark is His path on the wings of the storms"[4] transform the latter into "participation"?

As I see it, Barfield saw a genuine difference in the frameworks for understanding the world and transformed them into different logics. Recognizing that the "primitive" world is full of gods and the "scientific" world does "not need that hypothesis," he might have concluded that the scientific world is atheistic—but he makes it idolatrous instead. However, neither conclusion is necessary. The world of science is atheistic only if one claims that there is nothing but what science studies, and idolatrous only if one substitutes a feeling of total human competence for a recognition of our dependence on the Almighty. What is not recognized by Barfield is that both "primitive" and "modern" are faced with the same events; describable, despite the differences in the natural languages, in essentially similar words. The logic by which conclusions are drawn is usually the same, for the sophistication available in contemporary logic is seldom applied by most of us. However, the nearly identical descriptions of the observed events are interpreted within very different sets of categories. This difference of interpretation is not restricted to cultural differences. The same item or event may be described in terms of different scientific disciplines and also in nonscientific language. For example, a controlled substance may be described as a psychotomimetic or hallucinogen, as binding to a specific neural receptor, as having a specific structure and formula, *etc.* Terminology was drawn from psychology, physiology and chemistry, and could have been expanded to include other sciences. But "controlled substance" belongs to no particular science.

The above examples are some of the reasons why I do not find Barfield's categories very useful. I would have preferred the use of either Adler's or Broad's approach. Adler presented a different pair of categories—first-order questions and answers—in contrast to those of second-order. A first-order question has to do with direct applications to the world, such as:

> What is the right thing to do in these circumstances?
>
> Is that picture beautiful?
>
> How will this object behave in this field?

First-order answers respond to such questions.

Second-order questions are questions about first-order questions and answers, about language, or about second-order questions. Thus, there can be no third-order questions or answers. Some second-order questions are:

> On what basis does one evaluate an action as right or wrong?
>
> What does "beautiful" mean?
>
> What is the relationship between the criteria for beauty, goodness and truth?
>
> What is assumed in talking about matter?

It is obvious that Adler's distinctions are related to Barfield's alpha- and beta-thinking. Certainly beta-thinking is asking and answering second-order questions, but there is no place in Adler's systematization for Barfield's "original participation." For Adler, the answer to a first-order question about how to produce rain may be equally:

> Offer a sacrifice with appropriate rites.
>
> Repeat this magical incantation.
>
> Seed the clouds.

Participatory magic and scientific manipulation are equal answers to first-order questions. Thus, Adler avoids the cultural or ethnic snobbery of Barfield.

Broad, though earlier, presents a more sophisticated analysis. He separates science from mathematics, and both from philosophy, further distinguishing critical philosophy from speculative philosophy. Science, he notes, requires observation. It tells us, for example, what happens when gold is put in *aqua regia*. In this, it assumes that nature obeys uniform laws of causation. That is, science generally assumes and works with commonsense beliefs, although it is not restricted to them. Mathematics, like philosophy, is not observational. Like science, it begins with assumptions, though it calls them axioms. Unlike both science and philosophy, its logic is restricted to deduction. Critical philosophy, on the other hand, asks what we mean by "cause" and "uniform," and what is involved in claiming that there are uniform laws of causation. That is, it looks into the meanings of the words used and the basis of the beliefs assumed by members of the human race, including scientists. This is critical philosophy. But it is not Adler's second-order or critical philosophy, although it includes it along with the first-order philosophy.

Broad's critical philosophy is a requirement for relevant speculative philosophy, since a clear understanding of what one is claiming is a necessary foundation for a more abstract superstructure. Without this clarity, polysyllabic drivel will mislead, or produce nonsense. Speculative philosophy involves the widest possible overview of all human thought and experience, in the hope that "we may be able to reach some general conclusions as to the nature of the Universe, and as to our position and prospects in it."[5] This area includes the systems of thought, such as Platonism and Thomism, materialism and idealism, realism and instrumentalism, *etc.* It includes, for the most part, the matters Thorson considers in his study.

Thorson's first illustration of beta-thinking in science comes from mathematics; Gödel's 1931 theorem.[6] This involves two kinds of distinctions. The first of these, between first and second intention, goes back in principle to Averroes in the eleventh century. The alternate descriptions of linguistic usage from medieval times, *de re* and *de dicto*, are clearer to us. The former, "of the thing," is now called object language. It is the normal use of language to talk about entities in the world, as in the following three sentences:

The cat is on the mat.

Some swans are white.

All men are mortal.

The latter, "of the saying," is the use of language to talk about language. It is now usually termed metalanguage.

It is important to note that one does not have to be clear about what is going on to use metalinguistic constructions. For example, grammarians talk about nouns and adjectives, verbs and adverbs, clauses and phrases, usually without noting *de dicto*. But this is all talk about language. So are the discussions about the logical validity of arguments, and about what philosophers classify as semantics or metaethics, for example. Some examples of metalinguistic sentences are:

A period ends declarative sentences.

'Pepe' means 'Joe'.

'All dogs are canines.' is true.

Note that in the latter two sentences I am using a convention common among philosophers: single quotes form the name of written linguistic entities.

Although this is all that is necessary to follow Gödel's theorem, it is not the end. If one needs to speak of metalinguistic entities, one does so in the metametalanguage, as in:

' 'Pepe' means 'Joe'.' is true.

In this case, 'true' is not the same as in the earlier instance, but is another level up. In other words, 'true' is not one word, but represents a hierarchy of terms with no ultimate element.

These distinctions seem excessive to those not familiar with the paradoxes produced by their neglect. One version of the most ancient one I know, the Liar, is given in Titus 1:12. Such paradoxes, unless avoided, bring an end to rational analysis and communication.

The second distinction involved in the theorem is in the levels of logic, introduced by Frege.[7] The simplest logic, the sentential or propositional calculus, operates on complete sentences or clauses. More complex than the sentential calculus is the lower functional calculus, which involves functions or predicates, names and individual variables, with quantification over variables. The next step up involves predicate variables in addition to individual variables, with quantification over both. This level is necessary to formulate Gödel's proof. Neither of these distinctions is a matter of beta-thinking, although the theorem has consequences for the logic needed for both levels of thinking.

A consequence closely connected to Gödel's theorem is that there is no effective proof procedure, no set of rules or techniques that can be followed mechanically that will guarantee that a proof will be found for any theorem in the functional calculi.[8] There is an indication in Thorson's section (2), in the reference to "*mechanistic* logic," that this has not been appreciated. Logic, except in its simplest forms, cannot be mechanical. Perhaps what Thorson had in mind is that the nature of intelligence is not simply deducible *a priori* from first principles.

The second illustration, namely problems associated with describing and modeling intelligence, should primarily involve Broad's critical philosophy, although it may be entered under beta-thinking. However, much of the time Hofstadter sees the problem as one of presenting a scientific model, which is alpha-thinking even though it is, in a sense, about thinking. It seems to me that Thorson has intuitively recognized this and rightly objects to the implicit nothing-buttery that sometimes intrudes. There are, however, other aspects to the problem that are passed over. First, for example, is the necessity of human intelligence to understand any scientific model or theory, whether Einstein's theory of Brownian motion or Schrödinger's wave theory, as well as any theory of intelligence. Second is the incompleteness of all

scientific theory. For example, to say that gravity is universal, affecting every material body, and to present the full set of equations that describe gravitational attraction (ignoring the difficulties with the inclusion of three or more bodies), is not to explain why matter involves gravity. Science describes how things interact, but does not explain why nor define what they are.

There is an analogy between the study of computers and the study of intelligence. One may "explain" a computer in terms of power input and heat dissipation, but this has no more to do with the usual view of its function than describing the thermal parameters of the brain has to do with intelligence. One may also view a computer in terms of circuits or machine language, much as one can talk of neurons, synapses and trains of nerve impulses. To some extent, one can think in terms of software, although neural programs have not been deciphered.[9] All of these are legitimate ways to describe both computers and the brain that are involved in every physically measurable aspect of mental activity. But none of these approaches involve the reason we have computers at home and in the laboratory or office; namely, that a computer can manipulate input and output in a more useful pattern. Psychological studies may observe mental inputs and outputs, and gain some insight into cerebral hardware and software, but this is as far as science can go. To understand the science, as well as to understand understanding, is not the province of science. It will not do to chide the scientist for not providing what science cannot provide, unless he has moved from scientific description to scientism. However, then he is functioning not as a scientist but as a naive philosopher.

The matter of logical indeterminacy taken from MacKay is extended by Thorson, who seems to add a tacit assumption as he develops his argument. As I understand him, we can imagine an entity, **E**, which understands me totally. **E** recognizes that I am strictly determined and that my world is strictly determined. Thus, **E** can predict my every action. But I cannot accept these predictions. On the assumption that **E** is self-conscious, and therefore must be at least as complex as I; if there be an entity **N** that similarly understands **E**, **E** cannot accept **N**'s predictions any more than I can accept **E**'s. On the other hand, if **E** is more simple, so that it is not self-conscious, the problem of accepting or rejecting **N**'s predictions does not arise. But if **E** is so simple, how can it be assumed to understand? The discussion seems to involve contradictory, or at least contrary, assumptions.

I pass by the raft of problems connected with the interpretation of quantum physics where Thorson notes, "I admit the connection to the previous instance of β-thinking is fuzzy." He seems here implicitly aware that scientific modeling or theory-construction is not the same as doing critical philosophy.

The fifth illustration, regarding the recognition of order, seems to me to confuse pattern with communication, especially as the pattern has the linear sequence that we associate with language. Physical scientists find an order, a pattern, in the phenomena they study just as surely as molecular geneticists do. But none of the patterns mean, as human communication means, any more than the punch cards controlling a Jacquard loom. Granted, one may remark that a certain hole in one of the cards controlling the loom means that a specific harness is raised or lowered. This parallels the statement that a messenger RNA triplet means that a definite amino acid will be inserted into a protein at this point. However, this is a different sense of 'means' than that associated with language. There is talk of the translation of genes into proteins. Were this language, the protein would have to mean the same as the DNA or RNA sequence that produced it; but I have nowhere encountered this claim. When proteins fold into the complex pattern of an enzyme, they function rather than mean or communicate. It is certain that there is an analogy between DNA and language. The analogy aids our understanding, but we must never identify the entities we have put side by side.

Another aspect of the analogy may be noted. If we can imagine a culture which developed science in the total absence of writing, one in which all verbal communication was aural, it is unlikely that they would develop the analogy. It seems to spring from the letters-words-sentences pattern that partially parallels the base-triplet-protein pattern. It is plain that sentences are still linguistic whereas proteins are not DNA. It does not help to make the patterns more complex: letters-words-sentences-meanings and base-triplet-gene-protein, respectively. Meanings are the abstract entities that are translated, strictly speaking, so the analogy cannot be made perfect. Restricted to communication by sound, one might begin by phonemes; however, phonemes seem to have been suggested by the association between the sounds of the letters forming written words.

In the next to last section, Thorson notes that the scientific paradigm has been the machine, and suggests that the future paradigm may be the organism. Historically, the biological paradigm antedated the mechanical one. For example, it was once believed that minerals grew in the womb of the earth. And while philosophers, such as Descartes in the seventeenth century and Kant in the eighteenth, argued that animals are no more than complex mechanisms, vitalism—with its insistence on purposiveness—had a tight hold on biology. Harvey, Stahl, Buffon, Oken, von Baer and Driesch advocated it. But it was a dead end in science, more compatible with Lamarckianism than with modern views. My feeling, which I offer without being able to present a proof, is that life is so complex a collection of phenomena that it presents broad opportunities to those who have axes to grind. This kind of pattern seems to me to turn up in the use of quantum physics to support Eastern mysticism, and of entropy to support recent creationism.

I am not accusing Thorson of advocating such obfuscation. He may well be right that biology will furnish the new paradigm that we need. A recent study of ethnology pairs an organismic analogy with natural science in contrast to a language analogy.[10] Whatever analogies are helpful, to individuals or to groups, may be used freely. Yet I feel that, however useful such analogies may be heuristically, science will do better to extend the use of the logico-mathematical models that have served physicists so well. They have the virtue, essential when human beings are involved, of preventing the inadvertent insertion of unrecognized presuppositions

into scientific formulations. Rigorously deriving formulas quite effectively excludes bootlegged assumptions. As I understand the historical development, the earlier physical theories were interpreted mechanistically. But contemporary theories resist mechanical interpretations. I wonder if it is even possible to think of an orbital in a mechanistic, deterministic manner.

Thorson has much to contribute. However, I find that his insights, as presented in his paper, do not have a handle that I can solidly grasp. Had he focused his formidable intellect precisely and then communicated his perceptions with accuracy and clarity, we would jointly profit to a much greater degree.

NOTES

[1]Thorson makes reference to the 1965 paperback edition. The work was first published in 1957.

[2]M.J. Adler, *Condition of Philosophy* (New York: Atheneum, 1965), pp. 44 ff.

[3]C.D. Broad, *Scientific Thought* (1923), pp. 11–25. The same pagination is found in its numerous reprints.

[4]Robert Grant, "O Worship the King," v. 2 in Edward Bickersteth, ed., *Christian Psalmody* (London: Seeley, 1833).

[5]Broad, *op. cit.*, p. 20.

[6]The original paper in *Monatshefte für Mathematik und Physik*, 38:173–198 (1931), is translated in Jean van Heijenoort (not Heignenoort as in Thorson's note 22), *From Frege to Gödel, Source Book on Mathematical Logic, 1879–1931* (1967), pp. 596–616. Also in Kurt Gödel (B. Meltzer, trans.), *On Formally Undecidable Propositions of Principia Mathematica and Related Systems* (1962 and reprints). The translation in Martin Davis, *The Undecidable: Basic Papers on Undecidable Propositions, Unsolvable Problems, and Computable Functions* (1965), pp. 5–38, is not as good.

[7]See Gottlob Frege, *Begriffsschrift* (1879, reprint 1964). [Note that the full title is very seldom used.] Translations are in van Heijenoort, *op. cit.*, and, in part, in Peter Geach and Max Black, *Translations from the Philosophical Writings of Gottlob Frege* (1952). Although Frege pioneered, his notation is too cumbrous for use and has been superseded.

[8]See Alonzo Church, "A Note on the Entscheidungsproblem," *Journal of Symbolic Logic*, 1:40 ff (1936). With corrections, *ibid.*, 101 ff.

[9]See, for example, James P.C. Dumont and R. Meldrum Robertson, "Neuronal Circuits: An Evolutionary Perspective," *Science*, 233:849–853 (22 August 1986); especially pp. 849, 852.

[10]See May Ebihara, review of Elman R. Service, "A Century of Controversy: Ethnological Issues from 1860 to 1960," in *Science*, 233:371 (18 July 1986).

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J. HUXLEY, ATHEISTIC RELIGIONIST

Julian Sorell Huxley (1887–1975) had a distinguished ancestry. His paternal grandfather was the Darwinian Thomas Henry Huxley (1825–1895); his maternal great grandfather was Thomas Arnold (1795–1842), headmaster of Rugby. His father, Leonard, was a classics master of Somerville College, Oxford, founded a girls' school at Godalming in 1902.

After schooling by a governess until the age of ten, he became a day-pupil in the Hillside Preparatory School, London, where he found delight in natural history. At thirteen, he developed a lifelong interest in bird watching, particularly upon entering Eton with a scholarship, where he started a bird watching diary. At eighteen, he received a scholarship in zoology at Balliol College, Oxford. After reading about the life of Pasteur, he was inspired by the scientific method. When he was twenty-one he won the Newgate Prize in poetry, but used the award to purchase a microscope. The following year he obtained a B.A. with a first class in zoology; since that year also marked the Darwinian semicentennial, he resolved to continue his own studies in the Darwinian spirit. He received a one-year scholarship at the Naples Biological Station, where he investigated sponges. His results were published in the Royal Society's *Philosophical Transactions*. In 1912 he was appointed Assistant Professor and Chairman of the Biology Department of the new Rice Institute in Houston, Texas. Four years later, he returned to England during World War I.

After serving in the Army Service Corps and then in Intelligence, Huxley was made a Fellow of New College, Oxford, and Senior Zoology Demonstrator. He married a Swiss governess, Juliette Ballor. A year later, he joined the Oxford Expedition to Spitsbergen; he always enjoyed mountaineering. In 1925 he was made Professor of Zoology at King's College, London, and the next year was given a three-year appointment as Fullerian Professor at the Royal Institution. At forty, together with H.G. Wells and his son C.P. Wells, he published the *Science of Life*. In 1927 he resigned from King's but retained an honorary lectureship there.

As a member of the Colonial Office Committee on Education, he went to East Africa in 1929 to survey the biological education and nature conservation there. Subsequently, he made a number of lecture tours in the U.S. and received an Oscar for his documentary film, "The Private Life of the Gannets." At forty-eight he accepted the Secretaryship of the London Zoological Society. In 1939, with Professor

C.E.M. Joad, *et alia*, he conducted the Brians Trust program for the British Broadcasting Company (BBC) on "Scientific Research and Social Needs," thus becoming a national figure.

In 1944, he visited West Africa for the Commission on Higher Education in the Colonies. The following year he attended the bicentennial of the Russian Academy of Science, where he heard a lecture by the quack geneticist Lysenko. He served on the Hobhouse Committee on National Parks. In 1945 he was appointed Secretary and then elected Director General of the new UNESCO (replacing the proposed UNECO) for a two-year term. He was not a good administrator in this political position, although UNESCO profited greatly by his enthusiasm and broad knowledge, as well as by the loyalty of his staff. At the end of his term, he retired to Hampstead. At seventy-one he was knighted. He gave an address on "The Evolutionary Vision" at the Darwinian Centennial at the University of Chicago, where he was a Visiting Professor. He died at the age of eighty-eight.

Huxley was fond of nature—and solitude. He was early impressed by Wordsworth's line on Tintern Abbey: "I have felt a presence . . . " He recognized the need to preserve natural beauty and to promote architectural beauty, as well as to conserve natural resources. He exhibited great versatility, and showed a marked concern for human welfare, as illustrated by the following sampling of his activities. In 1924 he gave three lectures at Rice on "The Outlook in Biology," which dealt with the relation of science and humanities, and later, in 1952, became the President of the British Humanist Association. In 1935 he published a book entitled *Science and Social Needs*, and was also the first President of the Association of Scientific Workers. Earlier, he had attended the World Population Conference. In 1956 he received the Lasker award of the Planned Parenthood Association in America. Although he favored the development of atomic bombs—under surveillence of the United Nations—he was among the first to oppose the proliferation of nuclear weapons.

In 1920 Huxley did some research of metamorphoses of axcolotls that made headlines. At thirty-three he began his semipopular writing on science and society. At forty-one he joined the Society for Psychical Research, but failed to find any proof of communication with departed spirits. With Gavin de Beer he published *Principles of Experimental Embryology* (1934). At forty-eight he gave the Royal Institution Christmas Lectures on "Rate Animals and the Disappearance of Wild Life." His forte was publication, particularly popularization. At fifty-five he published *Evolution, the Modern Synthesis*. A year later, as his grandfather had done fifty years earlier, he delivered the Homanes Lecture on "Evolutionary Ethics." In 1949 he received the Kalinga prize for popular science and the Royal Society Darwin medal for his contributions to the theory of evolution.

Huxley believed inthe uniformity and unity of nature, but above all, in the continuous development of a single, ultimate world-substance. Evolutionary naturalism was his basic hypothesis; evolutionary humanism, his thesis—that is, man as the one and only agent for realizing life's further progress. Nevertheless, he claimed, "I consider myself to be a religious man, though I do not subscribe to a theistic interpretation of the religious spirit." This conclusion is based upon his own definition of religion, viz. "the reaction of the personality as a whole to its experience of the universe as a whole," particularly to "a man's holding certain things in reverence" and "his feeling and believing them to be sacred." He admitted however, that there will probably always be a conflict between naturalistic science and theistic religion.

Huxley's own confusion can be traced back to the indefiniteness of his religous heritage and the amorphism of his own religious education. His maternal great grandmother was mildly liberal and low-church orthodox. Her son, his grandfather, left the Anglican Church twice to become Roman Catholic. Another son, Matthew Arnold, upset people with his own critical faculty, despite a moral temperament and strong religious leanings. Julian claimed that his paternal grandfather, Thomas Huxley, a self-classified agnostic, was actually religious in view of his sense of reverence. As a child, Julian was wont to attend church only on festive occasions such as Christmas or Easter. He did admit, however, his enjoyment of the Eton chapel services, probably becuase of the prevelant atmosphere of awe and reverence.

In the reading of an essay by Archbishop William Temple, he was stimulated to study philosophy and religion so that he read much along this line. He was particularly impressed by his aunt Mary Augusta (née Arnold) Ward's "Robert Elsmere" (1887) with its emphasis upon social mission and its dismissal of 'legendary miracles.' His thinking about religious humanism was actually triggered in Colorado by his reading of John Morley's challenging comment, "The next great task of science will be to create a religion for humanity." In 1928 he published *Religion With Revelation*, which was amplified in 1956.

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Twenty-first in a series by Raymond J. Seeger on scientists and their religion.

Book Reviews

CIRCLES OF GOD: Theology and Science from the Greeks to Copernicus by Harold P. Nebelsick. Dover, NH: Scottish Academic Press, 1985.

This is an exceptionally important, if somewhat disappointing, book. Its importance lies in its seminal thesis which thematizes, perhaps for the first time, the view that—historically speaking—*both* science and religion are indispensible for each other's genuineness. Nebelsick makes this point with reference to the influence exerted by Pythagorean theology on Western astronomy until Copernicus. (The "Circles of God" is a shorthand expression for such an influence which made students of the skies take as an unchallengeable given the perfect regularity and circularity of the motion of the heavenly bodies.)

> Though religion may well be the impetus for scientific development, if the scientific aspects of thought remain captive to the religious ideology, which may have given them birth, science will hardly move beyond its rudimentary stages. In turn, religion is likely to remain caught in its own presuppositions and to remain insipid as well. (p. 69)

Nebelsick proves his thesis with impeccable scholarship, especially with regard to Copernicus. He rightly insists on "the *theologically charged atmosphere* of the Renaissance which gave rise to Copernicus' own heliocentric system" (p. 213). In particular, he shows that Copernicus was so imbued with the Pythagorean influence that "his primary interest was in *saving the circles*" (p. 233), thus blinding himself to the observable properties of the motion of the heavenly bodies:

> The Copernican theory . . . is a prime example of how the same theological dedication that may inspire us to turn our eyes to the heavens to discover the wonderful works of God may also prevent us from seeing those works as they are. (p. 257)

Hence, Nebelsick rightly extols the merits of Kepler by breaking through the apriorism of Copernicus and therefore preserving what was valuable in the Copernican hypothesis—by letting himself be guided, at the cost of immense personal work, by the empirical evidence he had inherited from Tycho Brahe. In fact, by so doing, Kepler discovered the elliptical rather than circular shape of the planetary orbits, and thereby he originated genuine theoretical astronomy:

> . . . he established a kind of harmony which the ancient astronomers and Copernicus could only dream . . . a harmony which, when translated into mathematics, showed nature to have an order of its own. That order could be penetrated only by ignoring preconceived theological and philosophical misconceptions . . . (pp. 253–4)

Briefly, the importance of this book is beyond question because it documents in a clear-cut case the mutual dependency or complementarity of science and religion.

Why does it then leave a somewhat disappointing impression? Because it adopts a perspective which is too narrow, it fails to explain why this complementarity occurs and why it should be taken into consideration by people of goodwill in all times, including ours. Concretely, this book practically ignores a fundamental dimension of the science and religion relationship—which can be called philosophical-humanistic—and alone explains both the cooperation and at least the partial alienation of science and the Christian faith. (*Philosophy* = reflective study of human knowledge; *Humanism* = doctrine of human dignity.) First, in fact, Christianity gave rise to science by stressing the importance of knowledge for human dignity; but then, to at least some extent, it estranged itself from science by ignoring the facts and implications of the enthusiasm for human dignity engendered by science itself. Nebelsick shows this lack of perspective when he explores the significance of Thomas Aquinas for the rise of science. To this end, he simply surveys the formal elements of the latter's system, which he then pronounces "inappropriate for the development of modern science and the modern world" (p. 158). By so doing, however, he completely misses a two-fold vital influence exerted by Thomas on the rise of science, notably by inspiring Galileo, the commonly acknowledged father of science. One influence is philosophical. Galileo developed his philosophical methodology dependently on Thomas, as has been abundantly proven by William Wallace since the early 1970's. The other influence is humanistic. Galileo was clearly inspired in his trailblazing scientific work by Thomas' pioneering insistence on the study of the cosmos as a service to God required by the dignity of the human creature, as can be seen from Galileo's own philosophical writings.

An additional shortcoming of this book is an inadequate ecumenical spirit. No other cause, in fact, seems to account for some misleading statements uttered in passing against the Catholic Church, as though they were self-evident—whereas they betray unfamiliarity with the complexity of the issues or the documentation—and so uncharacteristic of such a scholarly work. For example, it is clearly false that Thomas' "system was given [by the medieval Church] divine . . . sanction" (p. 83). It is also fallacious to say that Giordano Bruno and Galileo were condemned because they "were brazen enough as to defy its [the Church's] Aristotelian-inspired theology and cosmology" (p. xxiii). Especially jarring is to conclude the book by saying that Kepler " . . . 'proved' that

the 'God' of . . . Thomas and medieval theology was dead" while implying, at least by contrast, that Kepler had a nondefective conception of "the God of the Bible . . . again come alive" (p. 260). If this is what Nebelsick means, it is particularly objectionable because it contradicts the historical evidence and, above all, it tends to undercut the very thesis of the book by letting the reader think that in post-Reformation times it was no longer necessary to strive continually, by taking both science and theology into account, in order to entertain a genuine notion of God. In effect, Kepler himself is an example of how difficult it is to keep this balance because—for all his sincere Christian faith and undoubted scientific spirit—he effectively overrated science and underrated theology by making God the Creator subject to the propositions of Euclidean geometry, as has been proven for instance by Jürgen Hübner in his book of 1975.

These criticisms are meant not to denigrate but to enhance the value of this book. Its enlightening and timely thesis—if presented and understood in all its significance—can remove the fear of ongoing tension between science and religion, and actually help many spiritually to profit from it. The tension itself is providential, at least in that science—through its never-ending series of unforeseeable discoveries—continually stimulates thinking believers to reject the ever-pressing temptation of conceiving God the Creator on the model of the human mind.

Reviewed by Enrico Cantore, Director of World Institute for Scientific Humanism, Fordham University, New York, NY 10023.

Books Received and Available for Review

(Please contact the book review editor if you would like to review one of these books)

S. Ahlstrom and B. Mullin, *The Scientific Theist*, Mercer
R. Augros and G. Stanciu, *The New Story of Science*, Bantam
B. Clouse, *Moral Development*, Baker
G. Collins, *Innovative Approaches to Counseling*, Word
D. Demaray, *Laughter, Joy and Healing*, Baker
V. Eller, *Christian Anarchy*, Eerdmans
C. Evans, *The Quest for Faith*, InterVarsity Press
K. Granberg-Michaelson, *In the Land of the Living*, Zondervan
S. Jones (ed.), *Psychology and the Christian Faith*, Baker
J. Lilly, *Communication Between Man and Dolphin*, Julian
G. Martin, *Counseling for Family Violence and Abuse*, Word
L. McBurney, *Counseling for Christian Workers*, Word
S. McDonagh, *To Care for the Earth*, Bear
A. McGrath, *Understanding Jesus*, Zondervan
D. McKenna, *Mega Truth*, Here's Life Publishers
T. Miethe (ed.), *Did Jesus Rise from the Dead?*, Harper and Row
T. Molnar, *The Pagan Temptation*, Eerdmans
G. O'Collins, *Jesus Risen*, Paulist Press
O. O'Donovan, *Resurrection and Moral Order*, Eerdmans
C. Perry, *Why Christians Burn Out*, Nelson
C. Perry, *The Resurrection Promise*, Eerdmans
P. Pruyser, *Changing Views of the Human Condition*, Mercer Univ. Press
D. Robinson, *An Intellectual History of Psychology*, Univ. of Wisconsin Press
J. Swihart and G. Richardson, *Counseling in Times of Crisis*, Word
W. Thompson, *The Jesus Debate*, Paulist Press
R. Weidig, *The Creative Advance: From History to Mystery*, Berkeley West
J. White, *Putting the Soul Back in Psychology*, InterVarsity Press
E. Wilson, *Counseling and Guilt*, Word
N. Wright, *Self-Talk, Imagery, and Prayer in Counseling*, Word

PHILOSOPHY OF SCIENCE: The Natural Sciences in Christian Perspective by Del Ratzsch. Downers Grove, IL: InterVarsity Press, 1986. 165 pages. Paperback; $6.95.

This is the fourth book which I have read in the series, *Contours of Christian Philosophy*, edited by C. Steven Evans, and I must say that the calibre overall has been high. Ratzsch's book is another example of what insight, imagination and hard work can do to render a difficult subject accessible to the uninitiated but interested reader.

Beginning with a good working definition of science, the author discusses its general characteristics and lays bare its foundational assumptions. Rather than accept these assumptions as brute presuppositions, he argues that "the Christian has a broader context for thinking about science" (p. 18). The stage now set, the author raises the key questions he will address in the remainder of the book.

In the next three chapters he conducts a valuable historical survey which brings the reader up-to-date on developments in the philosophy of science. The dominant view of science from the mid-seventeenth century to the mid-twentieth century, which persists in some circles today, was characterized by a strong belief in Empiricality, Objectivity and Rationality. Data impress themselves upon the observer through the senses (Empiricality); the observer, without prior assumptions or theories, collects the data for examination (Objectivity); and the observer in his thinking steps logically from the individual observations of the data to a general statement about them, often called a law (Rationality). The problem with this view, says Ratzsch, is that this is not what happens in the process of discovery, nor has it ever happened. His critical expositions are succinct and convincing.

Growing out of the traditional view is the idea that all knowledge rests ultimately on experience. This idea stems from Locke's interpretation of Newton, finds full expression in Hume and is welcomed by leaders of the Enlightenment. Although it loses its appeal in the nineteenth century's Age of Romanticism, it is revived in the early twentieth century by the movement known as Logical Positivism. The author concludes chapter two with a concise two-fold criticism of Positivism.

The view of how science works changed dramatically in the 1960's and 70's, largely as a result of the work of Thomas S. Kuhn. As a consequence of his ground-breaking work, *The Structure of Scientific Revolutions*, the emphasis shifted from objectivity to subjectivity in science. Kuhn's central idea is that science is governed by paradigms which scientists

adopt. A paradigm is a "strong network of commitments—conceptual, theoretical, instrumental, and methodological— . . . that relates normal science to puzzle solving" (*Revolutions*, p. 42). When a significant and unyielding puzzle cannot be solved under a current paradigm, it may well precipitate the adoption of a new paradigm. This chapter might have benefited from a brief discussion of the role of "faith" (Kuhn's word) in a paradigm shift (*Revolutions*, p. 158).

Nonetheless, here, as elsewhere, Ratzsch's treatment is well balanced. Just as he correctly criticizes the extreme objectivity of the traditional view, so he rightly criticizes the extreme subjectivity of the Kuhnian view, especially the idea that all observation is theory laden.

In a brief introduction to the contemporary situation in science, the author observes that "objectivity, rationality and empiricality have been making a comeback over the past decade or so" (p. 73). Based on his account, one might view the philosophy of science in our time as a pendulum on the backswing from the subjectivity of the 1960's to the objectivity of the traditional view, though not going as far as the latter would dictate.

On the contemporary scene, broadly speaking, there are two competing views on the nature of scientific theories. The realist believes that they provide us, at least to some degree, with literal descriptions of the underlying structure of nature. By contrast, the anti-realist believes that scientific theories do not describe the real, but hidden, structure of reality. Examining the latter view first, Ratzsch distinguishes between three types of anti-realist positions. Then, after noting that contemporary philosophy of science has a strong realist tendency, he subdivides the realist approach into hard and "soft" realism. Because of the problems found in hard realism, most of those who want to keep "some connection between science and truth have developed various types of what we might call 'soft' realism" (p. 86).

Two closely related problems arise out of the discussions of "soft" realism in chapter 5. Since scientists have no direct access to unobservable occurrences at the micro-physical level, how can claims about them be confirmed? Furthermore, if there can be any number of distinct theories to explain a given body of data, and we have no direct observational way of deciding which, if any, theory is correct, "How can we ever, even in principle, find out which is the right theory?" (p. 93). The reader will find the author's metaphorical answer suggestive and intriguing.

As the title of chapter 6 implies, science has its limitations; there are many things that it cannot tell us. Not only can it not supply naturalistic explanations of the origin of the universe and the ultimate purpose of man's existence in it, but it is also not competent to deal with the fundamental questions of philosophy, theology, and psychology, among others.

Chapter 7 will be particularly useful to believers who regularly confront so-called scientific criticisms of Christianity. Ratzsch discusses four "scientific" challenges to religious belief and offers valuable apologetical responses. His epistemological counter-challenges are worthy of serious attention. For example, in responding to the criticism that religious belief is unsupported by evidence, Ratzsch points out that the challenge is not really about evidence but about background principles, and that the principle "no belief without evidence" is highly questionable.

In the final two chapters, the author provides additional help for the believer who wants to explore the relationship between Christianity and science. Chapter 8 establishes the legitimacy of pursuing science, provides good reasons for doing science and explains the important contribution that Christianity has made, and can make, to science. The last chapter addresses two related questions. The first concerns the influence of Christianity on the internal workings of science, and the second concerns the relevance of the Bible to the specific content of science. The author develops a typology of categories to deal with both questions and throws helpful light on two problems that have appeared in the literature for some time: the theory of complementarity and the question of the scientific authority of Scripture.

The high quality of this work could have been enhanced even further with a more liberal use of examples. The author's message would have been focused more sharply if the discussion of maxi- and mini-theories, paradigm formation and change, realism and anti-realism, and correspondence rules had been tied more closely to clear scientific examples. Also, the use of a few simple, well-placed flow charts, such as immediately preceding the discussion of the status of theories (p. 80), would have helped orient the reader to the discussion more quickly. Regarding the content, just a caveat about evaluating historical movements. While it is now popular sport to bash Positivism, it should be realized that even the contemporary Neo-Positivists readily admit that Positivism is as dead as the Dodo bird. As spectacular as the failure of Positivism was, however, it did produce some salutary effects, even if only that of encouraging writers and speakers of god-talk to be more careful about what they say. Considering the well-accomplished aim of the book, these, of course, are minor criticisms.

Ratzsch's work should have wide appeal, and be beneficial not only to the beginning student in philosphy, but also to the philosopher whose specialization is not the philosophy of science. The book is clearly and economically written and I hope that many others will gain from it as much as I have.

Reviewed by Gary G. Colwell, Assistant Professor of Philosophy, Concordia College, Edmonton, Alberta, Canada T5B 4EA.

ORIGINS: A Skeptic's Guide to the Creation of Life on Earth by Robert Shapiro. New York: Summit Books, 1985. 322 pages. Hardcover; $17.95.

Robert Shapiro, a biochemist and Professor of Chemistry at New York University, explores in this book the various theories that have been advanced for the origin of life on this planet. To examine these theories Shapiro uses a fictional friend, the Skeptic, "to sort out logic from illogic and science

from mythology." Following a prologue and a chapter on "Doubt and Certainty," which attempts to distinguish between mythological and scientific approaches to the problem of origins and points out the important criteria that a satisfactory scientific answer must meet, the investigation into the question of origins is begun at the lowest level, that of molecules and cell components. Shapiro makes use of an interesting imaginary device which he calls COSMEL, the cosmic orders of magnitude elevator, to help the reader visualize how the size of a cell or atom compares to objects of our everyday world.

Shapiro begins his analysis of the various origins theories with the Miller-Urey experiment, "the classic, best-known experiment on the origin of life. . . . There are about fifty small organic compounds that are called 'building blocks' as they are used to construct the four layer types of molecules important to life. Only two of these fifty (glycine and alanine) occurred among the preferential Miller-Urey products." On Lehninger's statement, in his widely-used textbook of biochemistry, that "many different forms of energy or radiation lead to organic compounds from such simple gas mixtures, including representatives of all the important types of molecules found in cells as well as many not found in cells," Shapiro comments:

> That statement, as written, is simply incorrect. . . . For some molecules it is true, if one ignores considerations of yield and attributes significance to the mere presence of a substance, in whatever amount. . . . Other biochemical substances, nucleotides for example, have never been reported in any amount . . . yet a mythology has emerged that maintains the opposite. . . . These errors reflect the operation of an entire belief system, one that I call predestinist. A predestinist believes that the laws of the universe contain a built-in bias that favors the production of the chemicals vital to biochemistry and ultimately to human life itself. . . . The facts do not support the belief, nor can we extrapolate it from what we know.

In discussion of the Oparin-Haldane hypothesis, Shapiro quotes biologist Carl Woese: "The Oparin thesis has long ceased to be a productive paradigm: It no longer generates novel approaches to the problem; more often that not it requires modification to account for new facts; and its overall effect now is to stultify and generate disinterest in the problem of life's origins. These symptoms suggest a paradigm whose course is run, one that is no longer a valid model of the true state of affairs."

On Panspermia, Shapiro concludes:

> When it began to appear likely that the earth did not have the strongly reducing atmosphere required by the (Oparin–Haldane) theory, several responses became possible. One was simply to modify or abandon the theory, but this option was not as attractive to some thinkers as an alternative one: abandon the earth, and move to the origin of life elsewhere. . . . Unless some hard data to the contrary should appear, we will prefer to remain with the simplest assumption: no external intelligence has interfered with events on this globe during the time covered by the geological record.

Shapiro concludes:

> It is not surprising that prehistoric syntheses of nucleotides have run into intractable problems. These substances probably were developed well after life began . . . the Central Dogma of molecular biology, 'DNA makes RNA makes protein,' was exactly reversed in the development of life: In the beginning there was protein. Protein begot RNA, and then both begot DNA.

If you are interested in a critical analysis of the various theories of origins, this is a book you should read. Although the book is not written with technical language and is intended for a general audience, it is helpful to know some biochemical terms in understanding Shapiro's arguments. I found this book to be one of the better ones I have read in analyzing the various origins theories. Shapiro does express a decidedly naturalistc approach to science. Thus, his quest for a solution to the problem cannot admit the presence of a creator; nevertheless, this is a book that I strongly recommend.

Reviewed by Bernard J. Piersma, Houghton College, Houghton, NY 14744.

ORIGIN SCIENCE: A Proposal for the Creation–Evolution Controversy by Norman L. Geisler and J. Kerby Anderson. Grand Rapids: Baker Book House, 1987. 198 pages. Paperback; $8.95.

I have for some time been of the opinion that the creation–evolution controversy has been primarily the result of conflicting world views, i.e., theism vs. naturalism. I have had difficulty correlating the idea that science must exclude any concept of the supernatural with the idea of the unity of truth and the clear teaching of Scripture that God is not only creator but sustainer of His creation. In the book, *The Mystery of Life's Origin* by Thaxton, Bradley and Olsen, I first became acquainted with the distinction between operation science and origin science. Geisler and Anderson have expanded upon the idea and presented their ideas in this book. It can easily be read by the lay person with little, if any, training in the physical sciences.

In the authors' words, "It is the thesis of this book that the misunderstanding [creation–evolution controversy] arises in part because of the confusion of different kinds of science" (p. 13). Science primarily deals with observations and events which can be repeated. "It is the proposal of this book that a science which deals with origin events does not fall within the category of empirical science, which deals with observed regularities in the present" (p. 14). Since origin events were unobserved unique events, the science of origins must deal with singularities, and hence must be different from empirical science which deals with observed regularities. The authors argue that a distinction should be made between operation science and origin science.

Early scientists did not find it inconsistent to believe in a creator, a supernatural primary cause, and to practice empirical science. As empirical science became more successful, it became more closely identified with only natural or secondary causes and belief in the supernatural was removed to only the spiritual realm. Since Darwin's time, science has been identified almost exclusively with naturalism; which has

insisted on secondary causes. "However, with the rise of the big bang theory, which deals with a discontinuous singularity, the universe is no longer to be viewed as an eternal, continuous, unbroken series of physical causes. Thus the door for a supernatural view is not closed, as Laplace thought" (p. 70).

This book contains concise "Summary and Conclusion" sections at the end of each of its seven chapters, which I found to be well done. In addition there are six brief appendices, such as "Summary of Creation Evidence," which are interesting and informative. The book is very easy to read, although some familiarity with the history of science is helpful in following some of the arguments presented. This is a good introduction to the concept of origin science. I trust that a more serious presentation of the concepts of origin science and operation science will be forthcoming.

Reviewed by Bernard J. Piersma, Houghton College, Houghton, NY 14744.

THE BIBLICAL BASIS FOR MODERN SCIENCE by Henry M. Morris. Grand Rapids: Baker Book House, 1984. 516 pages, indices. Hardcover; $24.95.

The Biblical Basis for Modern Science is perhaps the most extensive statement of the young-earth, flood-geology viewpoint in existence to date. It could perhaps best be described as a theological statement of Morris' view of modern science.

The book is divided into four general areas each containing several chapters. Part one, "Science and True Christianity," contains chapters on the following subjects: Biblical Theology, Biblical Cosmology, Biblical Supernaturalism, and Biblical Evolutionism.

The next three parts are devoted to areas of science. Part two deals with "The Physical Sciences" and includes chapters covering what the author refers to as Biblical Cosmology, Biblical Astronomy, Biblical Thermodynamics, and Biblical Chemistry and Physics. The third part is "The Earth Sciences," and covers Biblical Geophysics, Biblical Hydrology and Meteorology, Biblical Geology, and Biblical Paleontology. In part four, "The Life Sciences," the author discusses Biblical Biology, Biblical Anthropology, Biblical Demography and Linguistics, and Biblical Ethnology.

There are a total of 16 chapters, each covering some area of science. In each chapter the author discusses, from his perspective, what he considers the strengths and weaknesses of each branch of science. The majority of the book is devoted to a polemical discourse on the most common areas of scientific creationism; i.e., thermodynamics, entropy, dating methods, the flood of Noah, Noah's ark, fossils, and so forth.

In addition to the main text of the book, there are also several appendices on such subjects as "Bible-Believing Scientists of the Past," "Biblical Miracles," "Satanic and Demonic Miracles," "Zodiac Constellations," and "Global Processes Indicating Recent Creation." An extensive bibliography is also provided. Many of the references are from authors associated with Morris, but there are a large number of references from other sources as well. There are three very extensive and complete indices. Listings are given by subject, author name, and scriptural reference.

The book will appeal primarily to those who agree with Morris' theological views. There are some areas which many will seriously question. He discusses, for example, what he refers to as a "triune" or three-part universe consisting of space, time, and matter. He then attempts to show that this three-part universe is an analogy of the triune godhead.

Morris also emphasizes some other areas which many will question. He discusses in great detail animals mentioned in the King James Version of the Bible, such as "dragons," "unicorns," "behemoth,"and "leviathan." These are, of course, names derived from obscure Hebrew words and have been rendered variously in other English translations of the Bible. On page 356 there is a photograph of a "modern dinosaur-like sea monster." This is a photograph of what appears to be a badly decayed animal carcass of some sort. No citation is given by the author. Further, he only mentions it in the text in the same sentence describing such "living fossils" as the coelocanth and the tautara. He actually does not discuss the "dinosaur," only mentions the illustration. The picture may leave the reader with the impression that this is an important discovery, but Morris provides no confirmation of the discovery or its importance.

There are several interesting and worthwhile sections in the book. Its usefulness, however, is limited due to the author's narrow theological viewpoint—his emphasis upon the doctrines of the young-earth, flood-geology, and so forth—and Morris' use of questionable scientific and historical data.

Finally, from the title of the book, I was expecting a discussion of the role of Christianity and the Bible in the development of science. Anyone else expecting such from this book will be, as I was, disappointed.

Reviewed by Phillip Eichman, Assistant Professor of Biology, Harding University, Searcy, AR 72143.

HERALDS OF HEALTH: The Saga of Christian Medical Initiatives by Stanley G. Browne, Frank Davey, and William A.R. Thomson (eds.). London: Christian Medical Fellowship, 1985. 382 pages, index. Paperback.

> Government agents were instructed to provide themselves with a coffin, to be kept over the rafters in the living room, "just in case." Many failed to survive their first tour of duty.

This recommendation for British civil servants being posted to West Africa, "the white man's graveyard," vividly portrays the health hazards associated with the tropics until

well into the twentieth century. That missionaries should face the same risks is not surprising. That medical missionaries—doctors, nurses, and others—were challenged, and at times overwhelmed, by the magnitudes of the problems is a testimony to their commitment to the example of Jesus Christ, who spent much time healing the sick. That such Christian medical personnel made significant contributions to our knowledge of tropical disease is an exciting chapter in the history of the Christian church.

Heralds of Health is an account of these medical pioneers. The reader is introduced to the beginnings of medical missions as men and women, who ventured forth to preach the Gospel, recognized their Christian responsibility to alleviate the physical afflictions of the people they came to serve. Among the numerous parameters of tropical medicine described are: nursing and maternity services, child health, epidemic diseases, surgery, mental health, diseases of the eye, leprosy and tuberculosis, community health, and medical education.

The editors of this book (all of whom died before the publication of their work) and the ten other contributors have had extensive experience in the tropics. They write, therefore, with a background of first-hand contact with the problems, often as recognized experts in their fields. They also write with Christian compassion as they describe the problems facing Westerners, especially medical missionaries, in the eighteenth and nineteenth centuries. That much of their story is centered in Africa, India, and China and is mostly limited to British medical personnel is a bit disappointing to an American—especially if one's interests are largely in Latin America (which is hardly mentioned). However, we can be confident that this book, although it tells only part of the story, gives us examples of the role of Christian compassion in the face of many awesome diseases. These examples could, I am sure, be augmented by the lives and the accomplishments of medical missionaries in other parts of the world.

This book is filled with anecdotes of courage, devotion, and accomplishment that should be an encouragement and a challenge to all Christians. The writing is not technical and can easily be understood by non-medical people. It would be a valuable addition to a church library. It also provides numerous quotations and incidents that could be useful to anyone teaching microbiology or parasitology courses in Christian or secular colleges.

Among the numerous "heralds of health" described are well-known pioneers such as Albert Cook, David Livingstone, Florence Nightingale, Ida Scudder, and Mary Slessor. Contributions of less well-known people are also included. (Often these "less well-knowns" were such because they paid with their lives in attempts to serve God by efforts to heal the sick under conditions in which they themselves succumbed to the very diseases they were trying to cure.) The Christian missions' origin of such outstanding centers of tropical medical education and health care as Ludhiana and Vellore Christian Medical Colleges in India, Makerere in Uganda, and Peking Union in China is a significant testimony to the commitment of Christians to the spiritual and the physical well-being of countless millions in the tropical regions of the world.

Stanley Browne summarizes clearly in the last chapter, "The Cost and the Vision":

> They pioneered in bringing needy peoples the obvious benefits of Western medicine; they introduced medical education for men and women; they initiated nursing services and founded schools for nurses; they established standards of excellence, and showed that it was possible to do first-class medical work with second class equipment and facilities in third class buildings; they pioneered in community medicine years before the term became current and fashionable; they created a climate of acceptance, both of Western medicine and of social responsibility, and they introduced the ideals of compassionate caring for the unwanted, the rejected, the outcast. In all this they inspired a devotion that was as remarkable as it was unexpected. (p. 357)

Reviewed by Wilbur L. Bullock, Durham, NH 03824.

SAYING YES AND SAYING NO: On Rendering to God and Caesar by Robert McAfee Brown. Philadelphia: The Westminster Press, 1986. 144 pages. $15.95.

Saying Yes and Saying No addresses the issue of moral accountability in politics. The author's concern is the activity of the present federal government and the inactivity of the governed. Might "Rendering to God and Caesar" be a vital problem in the leading democracy, when masses subdued by tyrannies exceedingly outnumber the people who enjoy constitutional freedoms? A democracy which includes political pluralism, freedom of property, and safeguarding civil liberties, whether liberal or conservative, seems to be more capable of providing a higher standard of living for more people than any sort of contemporary totalitarianism. In turn, this material progress of the West has given rise to even more of its enviable freedom. Thus, any ostensibly redemptive attempts leading to the separation of material progress from an effective democracy would bring about only fatal discontent of the tyrannized masses and/or humiliating backwardness in material progress and technology.

Historical examples abound which demonstrate abortive attempts for solving this antagonism between material and social progress. All these attempts are characteristically nonspiritual. Thus, a book on rendering to God what is God's and to Caesar what is Caesar's, while rightfully challenging the reader to reach out to the oppressed, should also deliver an unambiguous message of Christianity. Professor Brown raises almost all the questions about the idolatry of political power, but his answers seem to be biased rather than balanced. In this writer's opinion, beyond being biased, Professor Brown did not develop sufficient biblical grounds to back up his claims.

The Bible does not remain silent about oppression and poverty. It has a powerful message to the oppressed and the oppressor, to the poor and the rich. This is not elaborated throughout Brown's book.

This reviewer finds it difficult to accept some of Brown's statements. One example of disagreement by the reviewer relates to the importance of converting Jews to Christianity. The author says it is not necessary (p. 12). Various passages teach otherwise (Rom. 2:24–29, 10:1–6; Acts 3:19–21, 20:21; Matt. 28:19).

Worship is to be rendered to God and not to Caesar. However, the latter may duly have to collect taxes to keep order and protect the people. Professor Brown's book is unbalanced in deemphasizing the first aspect and exaggerating the second. It is commendable in that it might wake up the American public. Our common denominator is, nevertheless, only the first aspect. As far as the second is concerned, I still believe that the United States is the only political power that is enabled by its democratic institutions and political strength to contain tyranny. While I cannot agree with many of the positions in this book, I recommend it for the purpose of stimulating thought and discussion.

Reviewed by L. Fabry, University of Utah, Salt Lake City, UT 84112.

THE PSYCHOLOGY OF BIBLICAL INTERPRETATION by Cedric Johnson. Grand Rapids: Zondervan, 1983.

In this thought-provoking little volume, Cedric Johnson attempts to shed light on the puzzling paradox of why evangelical scholars and laypeople differ so much among themselves in their understanding of what the Bible teaches on a variety of issues. His basic thesis, expressed in his own words, is that "there are no uninterpreted facts in the study of the Bible" (p. 10). While firmly committed to a high view of the authority of scripture, he is convinced that proper insight into the processes involved in discerning its divinely intended meaning can help us to make sense of the confusing array of interpretations that have arisen. Further, he proposes that an understanding of these psychological mechanisms and processes will enable us to divine the word of truth more accurately.

While drawing on the entire spectrum of psychological content, the author writes from a clearly cognitive orientation. His very insightful discussion of the mind as an executive process—sifting, selecting and combining data for comparison with existing schemata and incorporation into them—has a very familiar ring to one who has read cognitive psychologists such as Ulric Neisser. Indeed, his whole discussion of hypothesis testing and theory building seems to flow quite naturally out of Neisser's notion of the perceptual cycle whereby our expectations shape our perceptions, and are in turn modified by them. Again, in the author's own words: "We do not just soak in the truth; we actively process it" (p. 37).

Along with this theoretical perspective, the author places a healthy emphasis on the mutual accountability and responsibility of the interpreter of scripture on the one hand, and the church of which he is a part on the other. While there is good agreement among evangelicals on the basic essentials of our faith, there is a great deal of diversity when it comes to less central issues. It is in our understanding of these areas that we need to exercise interdependence in a spirit of mutual submission.

In the core of the book, Johnson discusses three major avenues by which bias can enter to produce differences in interpretation. The first and perhaps the most powerful of these is preunderstanding, the unique perspective we bring in the form of our schemata and paradigms which serve as interpretative frameworks for all our cognitive activities. This is a significant insight which I believe merits underscoring. It is essentially the same point made several years ago by psycholinguists such as Frank Smith based on their analysis of the reading process, applied here specifically to the reading of scripture. They have argued convincingly that what we take away with us from a reading session, by way of insight and understanding, depends far more on what we bring with us cognitively than on the information contained in the pages we have read. Given the necessarily personal nature of the hermeneutical process, Johnson maintains that preunderstanding cannot be dispensed with, but it needs to be recognized, taken into account, and hopefully compensated for.

The second type of bias arises from personality characteristics. On this theme, the author deals with several aspects of individual differences, one of the most interesting of which is field dependence-independence, whereby some people are more inclined to be analytic, others to be global and wholistic in their thinking. He identifies these two diverging tendencies with word-oriented Christians (those who emphasize the propositional truths of the Bible) and spirit-oriented Christians (those who emphasize our spiritual experiences), respectively. The final general biasing factor is culture and society. The author argues that our theological models are products of our own culture. Hence, they need to be tested in other settings and cultures in order to adequately assess their validity. He gives examples of how an entire cultural group can be "prepared" to receive a particular theological approach, liberation theology being just one example.

While the message of this book is not particularly profound, I have gained worthwhile insights from it. It serves as a reminder and a clarifier of what might, to some of the more astute among us, be almost self-evident. It does not assume any particular background in psychology and is thus suitable reading for a wide range of interested, thoughtful Christians. I warmly recommend it.

Reviewed by Harold Faw, Psychology Department, Trinity Western University, Langley, B.C., Canada V3A 4R9.

SEXUAL SANITY: Breaking Free from Uncontrolled Habits by Earl D. Wilson. Downers Grove, IL: InterVarsity Press, 1984. 144 pages.

Sexual Sanity is a great book. Great in style, for the author does not distance himself from the fallible victims, but has

stretched out a healing hand toward them. Great in its biblical perspective as well as in its general meaning, for a similar cure might help to break away from obsessions of other kinds. Finally, great in emphasizing that there will be no hopeless case if psychological theory and methods are based on biblical principles: "Sanity can be developed and even restored when it has been lost." Wilson has proved this through case studies.

His pilgrimage begins with a study of our sex-crazed world. "The society is preoccupied with sex, all individuals experience a high degree of sexual arousal and a low degree of sexual satisfaction." What should be the correct and helpful Christian response to this problem? Total rejection and incrimination of these people, or acceptance of both the person who is simply a fallible human and his/her obsessive behavior that is being sowed by the devil? Wilson stresses that the individual has a responsibility for making positive decisions to deal with these obsessions.

Aspects of sexual obsessions are: (1) the confusion of sexual and emotional arousal, (2) the destructive anxiety it brings about, (3) the powerful desire for continual stimulation in arousal-release patterns, and (4) the interaction of these elements. Sanity, on the other hand, means " . . . controlling our sexual behavior rather than being controlled by it."

The key question is how to switch the consumer from the "bigger-is-better," throw-away thinking to savoring the fine details. In search for biblical principles, Wilson has emphasized repentance, forgiveness, and the distinctive quality of sexual relations. The pleasure of giving is more satisfying than a "take-all-you-can" attitude. Sensuality should overcome sexuality, and "sex-for-a-life" should win over "sex-for-tonight." The most revolutionary concept today must be the one of "mutual ownership without domination," that makes relationships personal and nurtures the feelings of specialness and self esteem.

God conveyed the purposes of safety, security, and savoring in sexual pleasure. Neither promiscuity nor a temporary liason would aid us in finding satisfaction. The obsessional thinking of sexuality refers mistakenly to the "pent-up emotional energy or the need for mere sexual release." In healing it should be noted that an obsessive thought disorder precedes the abnormal sexual behavior. This thought disorder is learned; therefore, it may be unlearned. Overcoming obsession should " . . . strike the balance: Satan and our own evil predisposition are to be controlled allowing the Holy Spirit to give us strength in our own behavior." Sexual obsession is sin, and must be treated as such for it controls the mind. This is idolatry in a biblical sense since " . . . to be controlled by anything other than by Jesus Christ is to worship a false god." But God stands beside us in the struggle; He is always ready to forgive and repeats continually His forgiveness.

Common sexual malpractices do not become normal due to the frequency with which people engage in these specific sexual practices. Instead, normality is given by what the Bible has to say about sexual relations. *Sexual Sanity* offers not only elaboration on biblical morals, but shows how to break out of a vicious self-destroying and harmful obsession. Our cooperation with God's healing must then be threefold: " . . . present ourselves as living sacrifices, refusing to conform to the world's pattern, and choosing to be transformed." This is the proven way to sanity. I thoroughly recommend this book.

Reviewed by L. Fabry, University of Utah, Salt Lake City, UT 84112.

FIND YOURSELF, GIVE YOURSELF by Dick Wulf. Colorado Springs, CO: Navpress, 1983. 215 paages. Paperback; $4.95.

Recently, a great number of psychologists have begun writing books or consulting via media, linking their discipline to the transcendent. Some recommend courses for successful secular living flavored with text from the Bible, often taken out of context. Others stick more to the essence of the Scriptures, but do not pursue the goals of a victorious Christian life in the corporate sense. In contrast to these, Wulf has presented his revolutionary concept against these misleading trends and sets goals for a joyful, individual life for the corporate benefit of the Church.

Find Yourself offers frustrated Christians a great variety of new choices in meaningfully outreaching ministries to their neighbors. Accordingly, growing Christians will be provided with a biblical way to realize their own identity, and will be trained on how to consciously seek every opportunity to serve our Lord's Kingdom.

Part one of the book defines the purpose of our life on earth, which is building up the Church. The writer anticipates a fight, deploying spiritual weaponry such as love, faith, truth, and righteousness. However, the world does not see a strong and courageous army, but sees only "a religious form of its own humanistic lifestyle" in the Church. The army itself is subdued because the individual fighters are insecure and defeated. They are huddling together in that frustration seeking protection against the evil world instead of going out to confront it. The key to a radical change is godly self respect: searching for a unique identity, readiness in being pruned, helping others grow, and a lifelong commitment to God.

The second part provides a plan for building up the believer. The reader can focus on specific steps for personal solutions. Wulf has shown that this process of spiritual growth is "godliness with contentment." A powerless, mediocre Christian life cannot be used in the struggle against today's three main idols: money, pleasure and possession.

Starting with a bold acceptance and humble appreciation of ourselves, we should grow in a "distinctive personalized walk with the Savior." Special ways of communicating with God can demonstrate our love for the Creator. We should nurture and train our God-designed personal strengths and use them for others. We must act humbly, not for being better than others, but for being special in having other talents.

Find Yourself, Give Yourself is a major biblical contribution in developing both a corporately meaningful and individually enjoyable, contented way of Christian living. Wulf has kept a sound balance between the cited verses and his edifying and personal comments. This reviewer hopes that this book finds its way into every Christian's library.

Reviewed by L. Fabry, Univeristy of Utah, Salt Lake City, UT 84112.

THE MORAL WORLD OF THE FIRST CHRISTIANS by Wayne A. Meeks. Philadelphia: Westminster Press, 1986. 182 pages, indices. Hardcover.

"The Library of Early Christianity," to which this book belongs, is a series of eight books exploring the Jewish and Greco-Roman environments in which the New Testament developed. Wayne A. Meeks, the general editor of the series, is also the author of this volume. Professor of Biblical Studies and Fellow of Calhoun College at Yale University, Meeks has previously authored *Urban Christians: The Social World of the Apostle Paul.*

The five chapters of this book provide background information which is useful in understanding the milieu out of which Christian ethics and morals arose. Meeks describes this milieu in terms of first-century social, philosophical and Jewish settings from which Christian communities developed their unique grammar of early morals. In the process, Meeks shows that much Christian belief and behavior had its antecedents in the Hellenistic and Roman worlds out of which they grew.

While this book can be understood by most educated people, it will require some extra effort from those not familiar with New Testament backgrounds. The book is written in fairly simple language, but the specialized vocabulary may drive some readers to a Bible dictionary. Meeks assumes that he is not addressing neophytes. There are no pictures or charts, but there are ample footnotes and suggestions for further reading.

Meeks takes the position that some of the writings in the New Testament are not authentic, a stance which will pose problems for anyone who holds to the inerrancy of scripture. Pseudonymous ascriptions were not uncommon in the time during which the New Testament was composed (e.g., the Epistle to the Laodiceans and 3 Corinthians were attributed to Paul even though he did not write them). Scholars are agreed "that in the second generation leaders were writing letters in the names of Paul and Peter," but Meeks includes in this group Colossians, Ephesians, 1 Peter, and the Pastoral Epistles (pp. 113, 121, 147). Meeks thinks that some of the sayings in Matthew and Luke were really spoken by Jesus, thereby implying that some were not (p. 117). Furthermore, he believes that the Apostle John "would despise Paul's dialectical middle ground" (p. 147). The reader should, therefore, expect to find in this book a good deal of editorializing along with historical information.

Perhaps the most interesting chapter is the one which discusses the great philosophical traditions which arose out of Greece and Rome. This chapter is entertaining and amusing as well as informative. The reader is introduced to such stimulating characters as Musonius Rufus and Diogenes. Musonius Rufus, twice exiled by Roman emperors, stoically explains why being exiled is no evil. Only wrong thinking makes it so. And Diogenes wanders around making converts to cynicism by ridiculing boxing, spitting on people and asking Alexander the Great to get out of his light.

This book is recommended for a person who wants to know more about the moral climate of the first century and how Christian morality relates to it. It gives an overview of some of the prevailing philosophies, including the range of belief and practice in first-century Judaism. Meeks helps the reader better understand the moral and ethical implications of such New Testament documents as 1 Thessalonians and 1 Corinthians, both of which he discusses. Because Christians treasure the New Testament so highly, a book which helps them understand it better will be appreciated. Such is this book.

Reviewed by Richard Ruble, John Brown Univeristy, Siloam Springs, AR 72761.

DISCOVERING THE BIBLE by Tim Dowley (ed.). Grand Rapids: Eerdmans, 1986. 144 pages, index. Hardcover; $14.95.

This is a wonderful book. It has all the ingredients necessary to make it successful: readable writing, impressive photographs, interesting topics, and penetrating succinctness. Although the writing is done by six scholars, it is uniformly captivating and clear. The photographs are unusual in that there is not a bad one among them (and they are all done in color).

The topics include such grabbers as "Meeting at the Well," "Tombs and Bone-boxes," "Where was Jesus Buried?" and "What Did Jesus Look Like?" The 15 chapters, averaging less than nine pages each (including photographs), are brief enough to maintain the reader's interest but long enough to cover the topic.

Even if the reader knows very little about archaeology, this book can be read with profit. The introductory chapter by John McRay, professor at Wheaton College (Illinois), explains everything necessary for understanding the chapters which

follow. He describes the five major tasks in modern archaeology (surveying, excavating, recording, interpreting, publishing) and shows how they are related to biblical archaeology.

What follows in the remaining chapters is a cornucopia of stimulating prose and pictures illuminating and illustrating sites, artifacts and documents relating to Scripture. Pictures of coins, inscriptions, lamps, walls, busts, menorahs, synagogues and churches are offered to the reader along with an interpretation of what they mean. Some popular beliefs are also discussed and debunked (e.g., modern archaeologists are nearly unanimous in discounting the validity of "Gordon's Calvary"). The book covers both Old Testament and New Testament archaeology.

This volume shows what archaeology can tell us about biblical times. Much of what we learn can be used in helping us to correctly understand the Bible. The archaeologist's spade shows that biblical faith is rooted in historical and geographical reality. This volume does an excellent job of conveying the results of biblical archaeology, and also points to important excavations yet to be accomplished.

Some of the findings of archaeology confirm the accuracy of the biblical record. For instance, an inscription found on a pavement at Corinth contains the name of Erastus, the city treasurer, and most likely the official Paul mentions in Romans 16:23. A stone inscription from Thessalonica, Greece, contains the term "politarchs," a term Luke used in Acts 17:6 to refer to Roman authorities. Until this stone inscription was found, critics had accused Luke of creating this term.

As a guide to a knowledge of biblical archaeology, this book could be used with profit. It would be appropriate as a supplement in a beginning archaeology course or as a study guide for an adult Sunday School class. It would also be useful for individual study. For all who want to gain background knowledge which will make the Bible more understandable, and therefore more meaningful, this book is recommended.

Reviewed by Richard Ruble, John Brown University, Siloam Springs, AR 72761.

GLOSSOLALIA: A Bibliography (Studies in the Bible and Early Christianity, vol. 6) by Watson E. Mills. New York: The Edwin Messen Press, 1985. 129 + ix pages, index. Hardcover; $39.95.

CHARISMATIC RELIGION IN MODERN RESEARCH: A Bibliography (NASPR Bibliographic Series, number 1) by Watson E. Mills. Macon, GA: Mercer University Press, 1985. 178 + vii pages, index. Hardcover; $14.50.

Here are two compact, reasonably up-to-date bibliographic introductions for the individual who wants to find out what "tongues" and "Holy Spirit baptism" are all about, and for the charismatic who wants to go more deeply into the history and theology of his faith.

They are reviewed together because they are quite similar in organization and have considerable overlap in content. My sampling would indicate that at least 85% of the 1159 entries in *Glossolalia* are duplicated among the 2105 entries of *Charismatic Religion*. Extensive overlap is inevitable, since glossolalia ("speaking in tongues") is a distinctive feature of charismatic religion and receives a disproportionate emphasis from friend and foe alike. The stated purpose of *Glossolalia* is to bring the major relevant documents together into a single list. The coverage of *Charismatic Religion* is generally restricted to the United States, a limitation that some will say provides a distorted picture of the charismatic faith. The main body of the alphabetical, non-annotated entries in each volume is preceded by a bibliographic essay and followed by detailed indices.

The bibliographic entries in both volumes are primarily English, with many German, fewer French, and a sprinkling of other languages. Recent works are well represented through 1982, but more recent dates are rather sparse. Even in *Glossolalia*, there is a definite focus on the American experience, although the English language entries come from both sides of the Atlantic. Unfortunately, there seems to be a problem with the proofreading of *Glossolalia*; errors discovered by chance include: four entries out of alphabetical order, a few typos, and a few entries containing discrepancies with those for the same works listed in *Charismatic Religion*. Where the differences could be checked, the error lies with *Glossolalia*.

The lack of annotations is always a disappointment to this reviewer, but in this subject area it is particularly disappointing. The bibliographic essays and detailed indices are useful, but they do not substitute for good, critical annotations. So much of the literature is difficult to locate that one would very much appreciate knowing something of the content, points of view, and quality of argument before going to the considerable effort necessary to find and obtain the work.

There is no recognition of the growth of "independent congregations" as an important segment of the charismatic movement. *Charismatic Religion* does recognize three groupings: Pentecostal Groups, Neo-Pentecostal Groups, and the Jesus Movement. Not all groups commonly assigned to the Jesus Movement are charismatic, nor does "Jesus Movement" in any way simply equal the phenomenal growth of established independent congregations with different emphases in theology and practice. Even though there is a centripetal force leading to a recognition of dependence by many "independents," there is still a quite strong disdain for "the denominations," including the Pentecostal denominations. The International Convention of Faith Ministries, founded in 1979, now has a membership of 1,000 licensed and ordained ministers. ICFN and the "Word Movement," led by Kenneth Hagin, Sr. and Kenneth Copeland, are examples of this deficiency in coverage. Kenneth Hagin, Sr., whose Rhema Bible Training Center trains large numbers of pastors, is represented by only one citation in *Charismatic Religion* and none at all in *Glossolalia*, and Copeland is not represented in either volume, even though the teaching of both men has had a major impact on the national charismatic scene.

It is also unfortunate that the area of audio tapes has been neglected in both volumes. With maturity, the independent movement is producing more printed material, but charismatic religion has been well described as an aural religion. A tremendous amount of instruction and doctrine is carried by audio tapes, such as: "Vocal Gifts, Use and Abuse" by Derek Prince; "Why Speak in Tongues?" by Andrew Wommack; and, "The Basis and Purpose of Receiving the Baptism in the Holy Spirit" by Ernest J. Gruen.

Another problem with the introductory material, inevitably reflected in the bibliography, is the rigid equation of speaking in tongues with a state of ecstasy. Certainly, the experience of ecstasy is valued by the recipient, whether it accompanies glossolalia or some other form of prayer, praise, or worship; but the teachings of many nationally recognized teachers *stress* that feelings are not definitive. Rather, the Word of God is definitive.

You will need to carefully consider your needs and resources when deciding whether to buy one or both of these titles. The price for *Glossolalia*is a bit high for the bibliographic essay and the nearly 13% of its titles not contained in *Charismatic Religion*. Both volumes are easily carried and used, unlike Jones' more massive and complicated *Guide*. However, if you are contemplating extensive research, especially in a particular body or doctrinal emphasis, the comprehensive, two-volume guide by Jones has five times the citations, will do more things for you, covers the field worldwide, and is only two years older.

Reviewed by Eugene O. Bowser, Technical Services Librarian, University of Northern Colorado, Greeley, CO 80639.

DIVORCE MINISTRY AND THE MARRIAGE TRIBUNAL by James J. Young (ed.). New York: Paulist Press, 1982. 140 pages. Paperback.

It goes without saying that divorce has become a problem of the highest order in the United States and Canada. The impact of divorce is a broad one, with ripples reaching out beyond the husband and wife and their children to relatives, friends and indeed to the social fabric of society at large. It is known that certain kinds of people are more likely to become involved in divorce than others, such as those who marry in their teenage years, those who know their marriage partners only a short time before the wedding takes place, and those who have been married previously. It is also true that certain geographic regions of North America have lower divorce rates than other areas, and that certain religious groups have lower rates than the general population.

Traditionally, the Roman Catholic Church has taken a very strong position in opposition to divorce. The Roman Catholic theology of marriage is built upon the concepts of: marital indissolubility, an orientation toward procreation and rearing of children, fidelity to one's spouse, and the sacramentality of the marriage relationship. Divorced Catholics have been denied recognition of the legitimacy of subsequent marriages, prevented from receiving the Eucharist, and in general viewed as less than acceptable members of the Catholic community.

Pressures have been mounting in recent years to provide greater pastoral care for divorced and separated Catholics. Additionally, some have sought to modify Roman Catholic theology to bend to the contemporary realities of the large numbers of divorced people within Catholic circles. The increasing recognition of the signficance of the problem of failed marriages within this group led to a conference of behavioral scientists, experts in canon law, and those engaged in divorce ministry. This conference was sponsored jointly by the Canon Law Society of America and the North American Conference of Separated and Divorced Catholics. The book includes seven papers delivered at the conference. The titles of the papers include: "The Shape of Divorce Ministry Today", "The Adaptation of the Tribunal", "The Spiritual Journey of the Divorcing Catholic", "Estimating Emotional Readiness for Annulment", "What Theology of Marriage is Being Expressed in Tribunal Discussions?", "A Proposal for Remarriage After Divorce", and "Alternative Possibilities for Pastoral Care of the Remarried".

Most of the papers are quite short. For the non-Catholic, and/or the one unfamiliar with the writings and arguments within the contemporary Catholic Church, the issues seem underdeveloped. The most valuable aspects of this book of readings are found in the notes and bibliographic material which are a part of each article.

Reviewed by Craig E. Seaton, Associate Professor of Psychology and Sociology, Trinity Western University, Langley, B.C., Canada V3A 4R9.

PASTORAL CARE OF BATTERED WOMEN by Rita Lou Clarke. Philadelphia: Westminster Press, 1986. 112 pages.

It is always fun to review a book from a high school friend. It is especially so when the book is Christian, well written, and practical.

Dr. Rita Lou Clarke, Associate Pastor of the First Presbyterian Church of Garden Grove, California, has written a book for church people to help us understand and change the conditions that have led to the battering of women. She does this by first placing these women in our cultural context, which is "patriarchial and sexist." Her book centers on the major problem of a husband battering his wife, "striking her hard and repeatedly, with bruising, shattering blows" (p. 17).

To deal with this problem, several concepts must be overcome. One is that the woman enjoys being a victim. Another is that she could leave if she wanted to. A thesis of the book is that, in some ways, traditional ideology and patriarchial values support wife beating. "Our theology must be

challenged to make it liberating for all rather than oppressive for some" (p. 19). A study of some 120 cases of battered wives showed that none of them had a psychological need that was met by battering. Our cultural practices have placed women at a psychological disadvantage; women being taught to be dependent on men and to accept male authority.

The third chapter, physically and spiritually the heart of the book, is entitled "Theological Issues Related to Battering." Here the Christian issues of marriage as a life-long commitment, and suffering being the lot of the faithful, are dealt with. The standard Biblical passages in support of male domination in marriage, Genesis 1-3 and Ephesians 5:22-24, are discussed from both a traditional as well as a feminist perspective. This reviewer would point out that just as verses dealing with slavery are understood differently today than when slavery was the law of the land, so these passages will be generally re-understood as Christ liberating men from the bondage of dominance. Rita Lou and her sources guide us in this direction. As would be expected, the exodus experience is applied to the feminist, and rightfully so. "Feminism" is defined as an ideological commitment to the legal, economic, and social equality of the sexes. It does not seek to replace male supremacy with female supremacy. "A feminist is any person, female or male, who envisions and works towards equal rights, opportunity and human dignity for all" (p. 20). Defined this way, it would seem to require the church's support. Perhaps the most difficult New Testament passages are those idealizing sacrificial love, suffering, humility, meekness, *etc.*, as seen in Jesus. Here, too, Dr. Clarke provides helpful insights from the life of Jesus as rabbi and teacher with power and as one who treated women as equals to men. While some suffering may be redemptive (Christ's death on the cross and the suffering of those who follow him), it would be difficult to equate wife-bashing with cross-bearing. That is, by being objects of wrath, wives are not helping their husbands come into the Kingdom, nor are they advancing the cause of Christ in the world. Since most theologizing from the biblical texts has been done by males, it is refreshing to see old familiar texts handled from a new perspective.

The last chapter, "The Role of the Pastor," is intended to help not only pastors, but all church workers in understanding the remedies for battered women. Suggestions include using women as worship leaders in services, the use of more inclusive language, having speakers on the topic of wife abuse, and so on. Practical suggestions for counseling married couples are provided. Additionally, tips are given on how to stop potential batterers and a bibliography of available resources is provided.

This book is a practical source of information on a topic too long neglected by the church. While some evangelicals and Catholics feel uncomfortable with many of the goals of feminism, the elimination of wife-battering is one goal which all can accept. Its elimination, as Rita Lou points out, will require some fundamental shifts in our understanding of Biblical passages.

Reviewed by Fred Jappe, San Diego Mesa College, San Diego, CA 92111-4998.

SUPERNATURAL PRINCIPALITIES AND POWERS by Lester Sumrall. Nashville: Thomas Nelson Publishers, 1983. 142 pages. Paperback; $4.95/ Hardcover; $12.95.

Christ's sacrificial death for sinful nature has always been more real to me than believing in the existence of imperceptible demons and confrontations against them. The Scriptures, however, make it clear that an evil spiritual power is and has ever been an active and subtle adversary to both God and His creation. One needs to be a mature Christian in order to recognize the Tempter's gradual deceit. Books in this regard are important for making us aware of the danger of overlooking the real menace to our spiritual as well as physical lives. Accordingly, basic studies should depict the inevitable evil phenomena and manifestations. The more advanced books should elaborate on the difference and interaction between a person's own evil nature and Satanic forces, at both the individual and collective levels.

Since Sumrall's primary concern is obviously to describe manifestations of demonic powers in our times, his book shall be compared to the basic studies. He addresses popular false beliefs and practices such as necromancy, occult sciences, cabalism, astrology, witchcraft, and magic. He does not force the reader to look behind the turmoils of either a responsible choice between good and evil or the consequences of that choice, as C.S. Lewis did in the classic *Screwtape Letters*. Nor does he offer a treatise on today's cults, as in Dave Hunt's *The Cult Explosion*. Instead, Sumrall concentrates on the symptoms.

The strength of *Supernatual Principalities* is the exact, almost scientific, description of evil manifestations. Particularly interesting are the chapters about the cult of cabalism and the Devil's Dictionary. However, one concern I have is that he fails to address the supernatural powers of God, Christ, and the Holy Spirit. His subject has been almost completely restricted to a discussion on evil and demonic forces. Nevertheless, according to the Bible, God and His obedient angels are capable of confining evil. Christian readers must have hope to overcome the more frustrating aspects of this book and think of the supernatural power of the Light, too. We must remember that the truth will set us free and deliver us from all the powers of the devil. Living as Christians with this spiritual freedom is attainable, even though our peers are against that truth. Or is it the very reason for seeking that truth?

This book should be recommended for people basically unaware of evil forces, but mature Christians might find it not particularly exciting.

Reviewed by L. Fabry, University of Utah, Salt Lake City, UT 84112.

MONEY, SEX, AND POWER: The Challenge of the Disciplined Life by Richard J. Foster. San Francisco, CA: Harper and Row, 1985. 260 pages.

STUDY GUIDE TO MONEY, SEX, AND POWER by Richard J. Foster. *Ibid.*, 1985. 117 pages. Paperback.

Money, Sex, and Power is a sequel to Foster's *Celebration of Discipline*. As the latter book enjoined us to live disciplined lives as Christians, this current volume encourages us to extend that discipline into the use of money, sex, and power. Foster sets out his reasons for writing the book in the preface: "To the popular mind, topics like prayer and worship carry an aura of spirituality, whereas the themes of money, sex, and power sound terribly 'secular' at best. My longing throughout the writing has been to help people sense that as we come to these 'secular' issues we are treading on holy ground. To live rightly with reference to money and sex and power is to live sacramentally. To misuse and abuse them is to desecrate the holy things of God."

Foster's objective is to enable us to develop a Christian perspective on these crucial issues, and then teach us to live faithfully in response to that understanding. The book is well balanced in showing both the constructive and destructive uses of money, sex, and power, and encourages us to bring these areas of our lives into subjection to Christ. The book begins with a review of how Christians have dealt with these issues in the past. The three areas of money, sex, and power have been responded to by the monastic vows of poverty, chastity, and obedience, and by the Puritan emphasis on industry, faithfulness, and order, respectively. Foster's conclusions are that we need three new vows to deal with these questions from a Christian perspective in our present situation. To deal with money, we need a vow of simplicity. To deal with sexuality, we need a vow of fidelity. And to deal with power, we need a vow of service.

The book has separate sections dealing with money, sex, and power in turn. The section on money begins with a review of scriptural statements, especially the teaching of Jesus, with respect to the dark and the light side of money. Foster then goes on to suggest what specific actions are needed if we are to master and use unrighteous mammon in the service of the kingdom of God. He goes on to claim that we who follow Jesus Christ are called to a vow of simplicity. In dealing with sex, Foster goes on to analyze the relationship between sexuality and spirituality, and then examines what this means for both single and married individuals. He concludes that in the area of sexuality, we are called to a vow of fidelity. In the area of power, Foster illustrates both the constructive and destructive uses of power and suggests that in this sphere, in order to bring the use of power into subjection for the kingdom of God, we are called to a vow of service.

This is one of the most useful books that I have read in some time. It serves to both stimulate the mind and prick the conscience. Foster's writing is always clear and well organized. While one may disagree with him, there is never any difficulty understanding him. The usefulness of this book is increased by the *Study Guide*, which is particularly helpful if the book is to be used in a discussion or study group. This study guide includes comments from various sources on the issues raised in each chapter, daily scripture readings, questions for study and discussion, an extended bibliography, and suggestions for group exercises to help us incorporate the ideas presented into our lives. I can certainly recommend these books to anyone interested in developing a Christian perspective on money, sex, and power.

Reviewed by Steven R. Scadding, Department of Zoology, University of Guelph, Ontario, Canada N1G 2W1.

VINTAGE MUGGERIDGE by Geoffrey Barlow (ed.) Grand Rapids: Eerdmans, 1986. 192 pages. Paperback; $7.95.

The subtitle of this collection of ten addresses (1967–1984) and three interviews (1978–1983) is "Religion and Society." Any admirer of the wit and wisdom of this self-styled "vendor of words," Malcolm Muggeridge, will enjoy this stimulating glimpse of his wide and deep experience.

As a start, I would take the verbatim report of three concluding discussions with William F. Buckley, Jr. on his "Firing Line" television program. Buckley introduced Muggeridge as "perhaps the most eloquent English-speaking, lay apostle of Christianity." The first session, "How Does One Find Faith," began with the chairman asking the 75-year old Muggeridge how he found God. He admitted, "I rather believe in doubting . . . I think it's connected with faith"—like the stripe of metal in reinforced concrete. Muggeridge was intrigued by William Blake's comments: "They must ever believe a lie who see not with but through the eye," and added: "The one thing I'm quite sure could never happen is that human reason could prove transcendental truth."

The second interview, "Do We Need Religion?" was concerned primarily with denominationalism. It began with the query as to why Muggeridge was not a Catholic. "Having a very pessimistic view of the Catholic church," he claimed, "I would be joining something of which I was enormously critical . . . not an honorable thing to do." He was convinced that "the things in it that hold my admiration are the very things that it's turning its back on. . . . It's the feeling that the church itself is moving from these basic beliefs that is distressing." He confessed his own chagrin at the utopianism of all modern churches, including the Church of England, of which he was "technically a member." In particular, he regarded the World Council of Churches as "the *pons asinorum* of all Christian endeavors," with its accent on "secularism and secularistic activities." Moreover, he regretted that the very belonging to an organization is in a sense an act of exclusion.

He argued, moreover, that merely accumulating knowledge *per se* is a form of avarice. Men should "seek knowledge to understand truth better . . . knowledge can be part of truth, but it is not truth." He deplored that "man thinking of himself as one of the great marvels of creation is an ugly thing;" and saw man, rather, "as one single, tiny figure in the whole creation of God . . . that's when he's near to truth." Therefore, "happiness lies in being aware that, as a human

being created by God, one is fulfilling God's purpose—mystical reality."

"Peace and Power," the third interview, took place 26 months later. The 82-year old Muggeridge and his wife had become Catholics. Why? "Worship is a beautiful thing," was the reason cited. He went on to blame "the great sickness of the 20th century, which is science." He decried "this idiotic theory of evolution," which is often carelessly promulgated by professionals as fact rather than theory. This discussion led naturally to atomic bombs; in particular, their significance in the old concept of a so-called "just war." Muggeridge finally acknowledged that one may have to choose practically a lesser evil; even World War II might then be considered a "just war."

Muggeridge's own philosophy had been summed up in 1967 in Great St. Mary's Church in Cambridge in his address "Am I a Christian?" He confessed that he would not recite a creed "to which I could assent to barely one single proposition in honesty." What is more, he claimed that the churches today are not proclaiming the real teaching of Jesus. He himself looked up to one hero, Paulinus (355–431), "who decided that the only thing he could do (amidst the fall of Rome) was to help alight a lamp in a particular shrine."

As a teacher, I found especially interesting the sermon "Another King," delivered in 1968 at the University of Edinburgh service in the High Kirk of St. Giles, when he courageously announced his resignation as Rector. Chagrined at the students' expectation of free pot and pills as a prerequisite for education, he challenged them: "To see God is the highest aspiration of man—Seeing God means understanding, seeing into the mystery of things. . . . Whatever life is or is not about, it is not to be expressed in terms of drug stupefaction and usual sexual relations." He concluded, "as far as I am concerned, it is Christ or nothing."

An informative background is provided in "The Bible Today," an Australian lecture in 1976. He reminisced about having attended, as a youth, a Socialist Sunday School where deity was never mentioned, but hymns and collections were usual. In his discussion "Why the Bible?" he called it: "More Valid Than Ever—an Incredible Book." In answer to the question, "Is the Bible True?", he remarked that "our Credulous Era . . . far from being notable for scientific scepticism, is one of the most credulous eras in all history. . . . It is not that people believe in nothing—but that they believe in anything."

What about "The Relevance of the Bible Today"? Noting the value of the Old Testament, he found that for Christians the ultimate relevance of the Bible lies in the New Testament. "There is no possibility of producing definitive, objective history." For the Bible, however, "its gaze fixed on God rather than men, on truth rather than happenings, on the constant force of love rather than fluctuations of power, can never be outmoded or irrelevant." Looking upon "The Future of the Bible" he felt like the 57-year old Augustine contemplating The City of God amid the Roman ruins.

"The True Crisis of Our Time" he ascribes to two ills: "ergomania and erotomania . . . the raised fist and the raised phallus. . . . But where the spirit of the Lord is, there is liberty." Despite the evident self-destruction of our civilization, "Christianity, however, remains essentially a religion of hope."

While not yet a Catholic, he gave a keynote address in 1978, "On Humanae Vitae." He praised its sacramental notion of earthly life: "Life, any life, contains in itself the potentialities of all life, and therefore deserves our infinite respect, our infinite love, our infinite care." He ridiculed the Anglican bishop who contrived a special abortion prayer for "the occasion of murdering a baby."

Literature scholars will appreciate his address, "Dr. Johnson Looks Heavenward," which he gave when an octogenerian at Lichfield on the 200th anniversay of Johnson's death.

Muggeridge's own outlook is given in "The Prospect of Death," where he shows his scorn for terms such as "Sunshine Houses" for teenagers, the use of "retrospective fertility control" for abortion, and "mercy killing" for euthanasia. On the contrary, he believes "our existence here is related in some mysterious way to a more comprehensive and lasting experience elsewhere."

"The Universe Provides a Stage: Jesus is the Play" relates to a visit to Bethlehem, which he describes as being now a sort of Jesusland—like Disneyland. What a cheapening of the Incarnation! What a contrast with John I, "a passage amongst the greatest ever to be written!"

Two other essays are "Comrade or Brother" (men are not equal, but are brothers), and "Anatomy of Sainthood" about his long contact with Mother Teresa.

Reviewed by Raymond Seeger, retired from the National Science Foundation, Bethesda, MD 20816.

THE RESPONSIBILITY OF HERMENEUTICS by Roger Lundin, Anthony C. Thiselton, and Clarence Walhout. Grand Rapids: Eerdmans, 1985. 129 pages.

While we are living, we are integrating all our experiences into the totality of our "knowledge." Not only when we read or listen to a lecture, but when we look at a picture or even when we just simply walk. Integrating our reading, or listening, or observing means that this new experience becomes part of us and thus has to fit in with what we were before. As is pointed out in the book under review, we are active in all these activities. That means that our world view greatly influences how we interpret what we read—even how we read the Bible: For this reason, I was attracted to this book.

Lundin teaches English at Wheaton College, Illinois; Thiselton teaches Biblical Studies at the University of Sheffield, England; and Walhout teaches English at Calvin College, Grand Rapids. The subject is important to us because the knowledge we acquire has to fit in with the knowledge we

have; not just knowledge in the particular area in which we are specialized, but that which involves our whole being. So, truth we find has to fit in with what we already know. That means for us as Christians, above all else, that what we find has to fit in with our Christian beliefs. Our theories are not something that have a life independent of our faith.

That brings us to the second reason why we should be interested in the subject. As Christians, we are all aware of the different interpretations of certain biblical texts which keep us divided. In order to become one, we must learn to read His Word united, not accusing each other of traditionalism or liberalism. In that respect, this book will help us as well.

The book is divided in three parts. Part one, by Lundin, tells us about our hermeneutical inheritance. This part is important in showing us how we all work in an intellectual environment which is strongly influenced by Francis Bacon and René Descartes. Books, including the Bible, are written in a historical context by people. We must look at the historical context, but also realistically examine our own intellectual baggage. How much is our reaction influenced by theories which really are not to be held by Christians?

Part two, written by Walhout, starts by criticizing some modern theories, but goes on "to show how language and texts function in the context of all human actions" (p. 43). The author is present in the text we read, and we are active in reading. We can only understand a text because we have certain experiences. It means that our total experience in many dimensions of life is involved, including our faith in Jesus Christ and His Father, our Creator.

In part three, Thiselton looks at the parables of Jesus using the theories developed in parts one and two. Thiselton shows the shortcomings of several theories and concludes that the action theory helps us break the spell of well-worn models which sometimes brought confusion. A variety of actions may occur in a particular text, but no model can obviate the need "first and foremost to look at the text itself in its linguistic and historical particularity" (p. 113).

All in all, this is a book which I highly recommend for study. Not only will it help us in studying God's Word, but it will help us as well in our own professions. Are our theories well integrated in the totality of our lives? Or are they "just" theories, at which we look objectively from the outside, regardless of what we think of as real life?

Reviewed by Jan de Koning, Department of Mathematics, St. Michael's College, University of Toronto, Ontario, Canada M5S 1J4.

AN EVANGELICAL CHRISTOLOGY: Ecumenic and Historic by Bernard L. Ramm. Nashville: Thomas Nelson Publishers, 1985. 229 pages. $14.95.

Bernard L. Ramm, well-known theologian and writer, has aligned himself with historic orthodox Christology in this significant book. He covers a vast amount of material, from New Testament formulation to early creeds to the Reformation and then into modern theology.

An Evangelical Christology is ecumenical, in that it propounds an understanding of Christology common to Eastern Orthodox, traditional Roman Catholic and evangelical Protestant believers. In analysis of those who reject historic Christology, Ramm is polemic without being strident.

One problem of the book, which Ramm recognizes explicitly, is that it must oversimplify some issues in order to treat so many writers in a limited space. But as a survey of books about Christology, with critical evaluation of each major position or school, it is a valuable asset.

Ramm concludes that reductionist Christologies have attempted to present doctrines which are acceptable to moderns but have paid too high a price. They end up with a Christ who cannot save. They can have no victory over death. They cannot count on the presence of a living Christ today. They have given up the basis for the only theodicy acceptable today; a Christological theodicy. Finally, they have no epistemological basis to say anything certain to the world today.

An Evangelical Christology is a medium-sized treatment of a large subject. It is therefore condensed, with paragraphs which could bear expansion into book-length treatment. It both gives a helpful survey of issues and materials, and suggests, in text and bibliography, how to do further and deeper study.

Reviewed by Joseph M. Martin, Professor of Missions, Edward Lane Bible Institute, Patrocinio, M.G., Brasil.

BELONGING: Our Need for Community in Church and Family by S.D. Gaede. Grand Rapids: Zondervan, 1985. 277 pages. $9.95.

God made us to live in community, but much in the modern world militates against God's plan for us. It is necessary to identify the forces of modernity which keep us from developing deep and lasting relationships, and then resist them by God's grace. Thus, S.D. Gaede, Professor of Sociology at Gordon College, describes the stressful situation in which we live and prescribes ways to regain the community for which God created us.

The two spheres which Gaede analyzes are church and family. In both, there is a need to resist the impulses for self-gratification which characterize modern life and to make permanent commitments based on faithfulness to those whom God has placed in our lives.

Community, says Gaede, can only exist where there are lasting relationships, tradition, and shared vision. Mobility, a

quest for efficiency, and the many options which face us, all tend to develop "choicism," in contrast to learning how to live with a lasting situation. To build relationships, traditions, and vision will require a firm decision to go against the tide, to join with others in adopting a lifestyle contrary to the world's expectations.

Reading *Belonging* while in Brasil is interesting. Gaede's descriptions of modernity seem too harsh when seen from Latin America. But I'm sure he is right, and my perception, from a distance, is neither as graphic nor as profound as his. But even here, I can see the need for his suggestions on how to build lasting relationships.

Belonging is perhaps longer and more repetitive than necessary, but it has a balanced structure and is clear both in analysis and prescription. It deserves consideration by those desiring to see church and family survive and impact the world to accomplish God's will.

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FOUR PORTRAITS OF JESUS by Frank Colquhoun. Downers Grove, IL: InterVarsity Press, 1984. 84 pages. Paperback; $2.95.

Although the author, canon emeritus of Norwich Cathedral, supplies "Christ in the Gospels" as a subtitle, he emphasizes that there is actually only one Gospel. The first four New Testament books are carefully referred to as "The Gospel According to. . . . " They are by no means biographies, but rather individual portraits. Matthew sees predominately a Messiah promised to the Jews: he stresses the Messianic teaching (five discourses and seven parables), signs (nine miracles) and victory. John Mark, the Roman companion of Peter, portrays the Anointed Servant, His ordination (baptism), public works (18 miracles), and suffering (compassion)—even unto death. The Greek Luke, the only non-Jewish writer, visualized the universal Saviour. He carefully traced the background of the Christian message, the continual interest of some Jews in Gentiles (for example, Samaritans). He stressed Jesus' perfect humanity, His constant praying and three parabolic prayers, His concern for all sorts and conditions of people: publicans and poor, pietists and prostitutes, women and children. He exemplifies the grace of God abounding!

John's portrait represents the spiritual Gospel, it communicates meaning to the heart and mind. Jesus is revealed as uniquely the Son of God: concerned with eternal life now, to be obtained by faith; and as the Word of God made flesh, with many witnesses to His claims and signs (seven miracles). Particularly significant are Jesus' three dialogues and public discourses, including his seven "I am" sayings. The disclosures of the Son to the Disciples culminate in an expanded understanding of love as self-sacrificing (a "new commandment") exhibited in the glory of the cross. The lion, ox, man, and eagle (cf. Rev. 4:7) symbolize the four aspects of the One Lord as seen from the different viewpoints of these four writers. This is pleasurable and productive reading!

Reviewed by Raymond J. Seeger, 4507 Wetherill Road, Bethesda, MD 20816.

A HEART FOR GOD by Sinclair B. Ferguson. Colorado Springs: Navpress, 1985. 179 pages. $8.95.

A Heart for God is a serious book, but a joy to read. It combines deep theological insight, careful Bible exposition, and devotional application in such a fashion that horizons are expanded in a warm and pastoral way.

Ferguson, who is Associate Professor of Systematic Theology at Westminster Seminary, seeks to develop in his readers a heart centered in God. To do this, he focuses on God Himself. Each chapter is rooted in exposition of Scripture. This gives depth and specificity to each theme, factors often missing in both devotional literature and in systematic theology.

A Heart for God should be read slowly and meditatively to build Christian character. It should be reread, for the issues presented recur in Christian experience. It can be used profitably by pastors and teachers who want to present Biblical truth undiluted but in gracious and attractive ways.

Reviewed by Joseph M. Martin, Professor of Missions, Edward Lane Bible Institute, Patrocinio, MG., Brasil.

PREDESTINATION AND FREE WILL: Four Views of Divine Sovereignty and Human Freedom by David Basinger and Randall Basinger (eds.). Downers Grove: InterVarsity Press, 1986. 180 pages. $6.95.

One of a series of "Four Views" books, this volume has four mutally exclusive views of predestination and human freedom. John Feinberg adopts the view that God ordains and determines all things. Norman Geisler adopts a softer determinism, in which God does not cause all events but does know

ahead of time all that will happen, so that the future is still determined. Bruce Reichenback adopts an indeterminist position, saying that although God does know the future, he voluntarily limits His power in respect for human freedom, which He created. Clark Pinnock goes a step further, denying that God foreknows the future. His omniscience *a la* Pinnock, enables Him to know all that can be known, but this does not include the future.

After each of the four writers expounds his position, the other three give responses. Each of the views expressed is therefore questioned from three different perspectives. The effect is to leave the reader with the impression that, although the writers are competent thinkers, none has achieved the definitive solution to a perennial problem in Christian thought.

Predestination and Free Will is a useful survey of four views, but leaves many questions to be dealt with in lengthier treatments of each position. Fortunately that is a possibility, since the four writers have published other works which deal with the same issues. There is also a helpful bibliography to orient further reading.

This reviewer's main disappointment is that the book's approach is more philosphical than scriptural. While this might be explained by the necessary brevity of each section of the book, the result is to leave a sense of four human views with some biblical moorings, but lacking divine authority. Even the view I agree with was not fully convincing as presented.

Although written clearly by capable scholars, *Predestination and Free Will* probably will not convince readers of one of the positions, nor promote tolerance and mutual understanding of those who disagree on these issues. One hopes it will force readers to examine more carefully how the Bible presents God's sovereignty and human freedom.

Reviewed by Joseph M. Martin, Professor of Missions, Edward Lane Bible Institute, Patrocinio, M.G., Brasil.

And we are put on earth a little space,
That we may learn to bear the beams of love.

William Blake
From "The Little Black Boy," *Songs of Innocence*

Letters

Reflections on Professor Enrico Cantore's Book Review—*Circles of God: from the Greeks to Copernicus* (see p. 232)

Prof. Nebelsick's book is an admirable defense of a thesis (stated in the preface) that is at the "heart" of what ASA is all about:

> . . . our thinking about God and his relationship to the world, our "theology," is therefore decisive not only for our own religious beliefs; equally important, our theology is quite determinative of the way we understand the world as well. Our thoughts about God and the world in relationship to him will have a quite crucial effect on how we are enabled to know nature and interact with it. . . .
>
> My [Prof. Nebelsick's] attempt to clarify both the positive and negative aspects of the interrelationships of theological science and natural science has two purposes. On the one hand, it is hoped that the evidence brought forth will put us on guard against the danger of permitting the presuppositions of either of the two sciences to dominate each other. On the other hand, one may trust that such a discussion will expose the torpitude which results from thinking that natural science and theology are so disparate that the one has nothing to do with the other. What we believe will eventually have to do with what we think about the world and the way we interact with it. If we believe in God, the way we know and treat nature will eventually expose our relationship to God and define the kind of God we believe in. As the question regarding God more often than not is, not whether we believe in God, but what kind of a God do we believe in, so with regard to the world, it is not, do we have an understanding of it, but how do we understand it. (*Circles of God*, preface.)

As the book is *extremely readable*, even for non-specialists in the history of science-theology interaction, I would hate to see the negative note in Cantore's review discourage *Journal* subscribers from reading this very pertinent book. The first sentence of Professor Cantore's review ("This is an exceptionally important, if somewhat disappointing, book.") is unnecessarily negative and may discourage some from reading the book. Professor Cantore evidently feels that Professor Nebelsick has slighted Thomas' important contributions to the creation of a theological atmosphere conducive to healthy scientific exploration of created reality. In my opinion, Professor Cantore has ignored the excellent chapter on late Medieval cosmology (pp. 149–199) that discusses Thomas' positive contributions to a theological understanding that motivates proper scientific exploration, in particular Thomas' insistence on the centrality of the doctrine of *creatis ex nihilo*. On the other hand, Professor Cantore has a right to be annoyed with the book's concluding pages which *imply* that Thomas' theology was devoid of *biblical content* as contrasted to Kepler's *nondefective* biblical conceptions of God and his relation to the world. I am sure that Professor Nebelsick did not intend the ungraciousness latent in these remarks at the end of *Circles of God*. St. Thomas' profoundly biblical attitude toward all scholarly activity is well captured in his prayer:

> CREATOR, beyond any words of ours to describe. Most gloriously, you have disposed all parts of the universe. You are the true source of light and wisdom. You are their first and final cause.
>
> Pour out now, I beg you, a ray of your clear light upon my murky understanding, and take from me my doubly dark inheritance of sin and ignorance. You who inspire the speech of little children, guide and teach my tongue now, and let the grace of your blessing flow upon my lips. Grant me a sharp discernment, a strong memory, a methodical approach to study, a willing and able docility; let me be precise in interpretation and felicitous in choice of words.
>
> Instruct my beginning, direct my progress, and bring my work to its proper finish: You who are true God and true Man, living and reigning forever!

In conclusion, I strongly recommend Professor Nebelsick's *Circles of God: Theology and Science from the Greeks to Copernicus* to the *JASA* readership. It makes a very readable and important contribution to the ongoing dialogue between natural science and Judaeo-Christian theology.

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Excellence and Mediocrity

I was quite pleased to read in the June 1987 issue Dr. Bube's article, "On the Pursuit of Excellence," especially since this is the first time I have seen this topic addressed from a Christian viewpoint. Of course, one shouldn't expect to cover all aspects of a broad issue in a single paper; nevertheless, I would like to mention some related points.

The pitfalls seen by Dr. Bube in striving to be No. 1 are real, yet mediocrity brings its own pitfalls (I Tim. 3:7). If faculty excellence is loosely defined as high reputation and visibility in one's profession, then consider that fame brings greater opportunities to interact with other "tentmakers" (Acts 18:1–2). It opens doors to present the Gospel to those who would not listen to the testimony of an "ordinary" person (Acts 21:37–39, 28:22).

Such opportunities would be even more potent if Christ could be glorified in the renowned achievement itself. Unfortunately, I have yet to hear of a Nobel laureate giving God any credit in scientific discovery. Thus the lie is perpetuated, that faith in God and intellectual prowess are antithetical. One remedy is that Christian faculty begin to believe God to provide inspiration for scientific breakthroughs.

There are a few academic institutions, such as Stanford, which are in the running for first place recognition. However, these are far outnumbered by colleges which rate noticeably below No. 1 status. Many such universities face a squeeze due to declining availability of federal and other funds, simultaneously bringing tightening criteria for appointments, promotion, and tenure. "Negative excellence" in nonprofessional areas of life may occur, not because of ambition to become No. 1 academically, but due to attempts to maintain an average position. If reductions in force are mandated, remaining faculty may feel they are being asked to make bricks without straw (Ex. 5:7–19).

One of my Christian colleagues has proposed that the professorial job description is like the Mosaic law: one cannot possibly fulfill it all within the typical work week (Acts 15:10). He has decided to cope by rather brazenly neglecting certain duties and concentrating on what God is leading him to do.

Again, I thank the author for addressing the topic of excellence. He has made many valid points which hopefully will generate continuing discussion and corresponding actions.

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What is the Point of the Death of Ananias?

One may ask why Jerry Bergman revised Acts 4:32–5:11 in the December 1986 *JASA* so that it would support his claim:

> This passage vividly shows that community concern was not a Christian option, but a requirement that was practiced by all the faithful.

The crucial section is Peter's statement in Acts 5:3, 4, where Bergman omits the part I have italicized. In the Jerusalem Bible, which is the version he used, this reads:

> "Ananias," Peter said, "how can Satan have so possessed you that you should lie to the Holy Spirit and keep back part of the money from the land? *While you still owned the land, wasn't it yours to keep, and after you sold it wasn't the money yours to do with as you liked?* What put this scheme into your mind? It is not to men that you have lied, but to God."

Ananias and Sapphira died, not because they withheld part of the proceeds, but because they claimed that the part they gave to the apostles was the total sum realized. Lying killed them. Lying has its source in Satan (John 8:44). Lying leads to perdition (Revelation 21:8, 27; 22:15).

Was what Joseph Barnabas gave to the apostles everything he owned? There is no way of telling. All we know from the Scripture is that it was the total proceeds from the sale. Did others do as he did? We do not know. The others that are mentioned earlier (4:34, 35) may have, but Peter's statement suggests that a gift of part of the proceeds was sometimes, at least, made. But no certain conclusion can be drawn from this lack of definite information.

We need to learn to be very careful in dealing with Scripture, with other written material, and with the raw data on which we base our conclusions. It is much too easy for us to slant matters, however good our intentions. And we unfortunately often fail to challenge a slant, though we intend careful objectivity.

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God and Chemistry

I really appreciated "Chemistry, a Gift of God" by Russell Maatman in the December 1986 issue.

Ever since I studied the Meyerhof scheme and Krebs Cycle for the breakdown of sugar into energy as a first year medical student, this cascade of one chemical reaction following another has thrilled me as though it were a musical symphony.

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The Sapiential Potentiality of Science

My praise to God and congratulations to Dr. Russell Maatman for his "Chemistry, a Gift of God" (*JASA*, December 1986, pp. 232–236). I felt moved by it because the author:

1.) Understands chemistry as a whole—and not only from the formal but also from the concrete point of view, as a researcher and a teacher in the field; a rare combination to judge from my experience among physicists!

2.) Loves chemistry as a life commitment, proving thereby that science truly deserves to be called "a vocation" according to the famous phrase by Max Weber.

3.) Makes chemistry understandable and attractive to all intellectually alert persons; in particular, he stimulates chemists to practice their discipline in a manner that fosters human dignity by its respect for reality, enthusiasm for the beauty of the same and discharge of the responsibilities that arise from scientific discoveries and applications.

4.) Unselfconsciously integrates chemistry into the Christian theology of creation.

Given this opportunity, I would like to stress that this article may serve as an example and encouragement for what I would call "the sapiential potentiality of science." In fact, the *sapiential attitude* is the stance by which a person recognizes and loves God through his consideration of observable reality, as the Book of Wisdom (13:1–9) and Paul (Romans 1:19–20) strongly recommend. (The Lutheran theologian Gerhard von Rad is the outstanding authority on this topic.)

It seems to me that Christian scientists like the members of ASA should not only recognize the sapiential potentiality of science, but also foster it in others as well as in themselves. For many among their colleagues, students and the public they encounter are called by God to recognize him not in spite of, but because of, science. Yet in various ways they feel hesitant or reluctant to assent to this call because of their lack of adequate religious upbringing, the overspecialization of their scientific training, the hostility against religion fostered by modern philosophy in the name of science, the lack of sympathy and even interest of theologians with regard to science, and the like.

The urgency of actualizing the sapiential potentiality of science in contemporary society becomes every day more evident. For contemporary public opinion—in direct contradiction to the Christic origination of science—takes more and more for granted that to be scientific means to postulate a complete irrelevance of God to human affairs. The result, as we all know, is a flood-like spreading of a radically dehumanizing mentality which threatens to destroy society as a whole, beginning with the young. As a recent example, the National Research Council—the most prestigious and official scientific body of this country—strongly recommended a massive distribution of condoms by public agencies as the decisive remedy against teen pregnancies—and it did so in the name of scientific realism and sophistication.

It is clearly up to Christian scientists to help turn this dehumanizing tide that attracts the wrath of God on our society (cf., Rom. 1:18). To this end, it seems enough that they humbly pray to become generous and prudent instruments of God's Wisdom, then cordially share with their colleagues, students and public their own love of God and neighbor as fostered by science—by responding to questions, clarifying doubts, strengthening resolutions, exposing pretenses, and so forth.

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"Progressive Creation" and the "Theology of the Cross"

Pun's "A Theology of Progressive Creationism" (March 1987) is to be commended for making explicit the theological tradition from which it stems. This is made quite clear in the introductory remarks on the theology of Calvin. At the same time, there are theological positions taken in the article which seem problematic to me, and that require further discussion. I want to focus here on a major issue, Pun's remarks on Luther's theology of the cross. These were prompted by my suggestion (June 1986) that it is that theology which should provide a basis for dealing with the issues of creation and evolution.

Pun's main point about this seems to be that Luther "tends to propagate a theology of paradox." There is certainly good reason for saying that. Luther himself introduces his theological theses for the Heidelberg Disputation, which are very important for the understanding of his theology of the cross, as "theological paradoxes" (*Luther's Works*, vol. 31, Fortress: Philadelphia, 1957, p. 39). For some, a theology of paradox may automatically be disqualified from further consideration. But the fundamental question ought to be whether or not such a theology is biblical. I Cor. 1:18–31 shows that it is, stating that it is to the foolishness of God that we are to look for wisdom. The whole point of the theology of the cross is that God is revealed in weakness, suffering and loss, in what appears to human wisdom as folly. The list of biblical references to God's activities in my June 1986 Communication shows that this theology of the cross, this propensity of God for creation when there appears to us no possibility for creation, extends throughout scripture.

The paradoxical character of the theology of the cross does perhaps result in a tendency to accept the fact of human evil without requiring an adequate historical explanation for the origin or propagation of evil. (However, that tendency can be exaggerated. Pun does not mention one of the most promising approaches to the problem of the sin-evil-death complex which I sketched in my March 1986 paper.) We should certainly try to understand the problem of evil as fully as possible. However, we also need to remember that evil is fundamentally privative, destructive, and pointless—"a poetic lie," as it has been called. Consequently, we shouldn't be surprised if we can't fully understand the whence or the why of evil. We can't always make sense of evil because evil is, at bottom, senseless.

That is neither a mere philosophical abstraction nor a counsel of despair. For Christians who are afflicted with some terrible pain or loss and who wonder, "Why me?" or "Why this person I love?", it can be helpful to realize that it is part of the character of evil to be senseless. One cannot always explain why evil happens in the way that it does. God can, of course, bring good out of evil, but that is because God is the One who creates out of nothing.

Human reason finds it difficult to live with the tension which the theology of the cross demands. Various rationalistic theologies may seem much more congenial. But the revelation of God in the cross also tells us more about the meaning of the world than unaided human reason is able to discover. The proper task of reason for the Christian is to understand the world in the light of the cross.

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Can Science Reinforce Meaning and Purpose?

The fascinating review article "Scientific Contribution to Meaning and Purpose in the Universe" by Herrmann and Templeton (June 1987) has raised a number of questions in my mind, which I hope you may address in the future.

The title of the article suggests that an area of knowledge called science can in some way reinforce the Christian belief in meaning and purpose. It may seem churlish to subject such an approach to criticism in a journal which has recently been given its present title, but I am happier with the title of the journal which includes the word "perspectives" than with the title of the article which does not explicitly involve human personality. Let me illustrate what I mean.

The article leans heavily on quotations from eminent mathematical physicists, and the scientific contributions that it mentions are largely those derived from mathematical physics. For example, Heisenberg's principle is stated to have produced "the end of classical physics and rigid determinism," although Einstein's colourful objections to this view are quoted. Two questions arise. The first is purely scientific and is concerned with measurement that necessarily disturbs what is being measured. Could this be the cause of Heisenberg's principle? The second question is whether "rigid determinism" has any meaningful overlap with mathematical physics.

The relevance of Heisenberg's principle to causality seems to rest on the premise that the universe consists in essence of particles and waves. It is not surprising that mathematical physicists think so, because they are daily occupied in contemplating particles and waves. But those of us who work in universities know that although in the department of physics all is emptiness except for an occasional speck of matter or energy, this is by no means true next door in the department of chemistry. Voltaire's statement comes to mind that he left Paris with the world as a plenum and arrived in London to find it a vacuum. Other departments have different preoccupations. Mathematics departments are inhabited by axioms and logical connections, while in sociology minds are full of class and power structures. All our colleagues have their own notions and no doubt all these are valuable and important. But I feel reasonably sure that I am not a collection of particles and I doubt whether any of your readers are governed by Schrodinger's and Maxwell's equations. Why should mathematical physics be the supreme and all-inclusive science? Might it not be more correct to regard the constructs of mathematical physics as models of parts of reality rather than reality itself?

My own model-making has been electromagnetics, and I have spent most of my life with Maxwell's and Faraday's ideas; incidentally, both were convinced Christians. I am sure that Maxwell would have been amused by the idea that his equations "governed" anybody or any process. He wrote some splendid humorous verse poking fun at such notions. It is not even easy to find Maxwell's equations in Maxwell's treatise. He was concerned with phenomena and not primarily with mathematics. The mistaken view that Maxwell's theory is contained in Maxwell's equations is due to Hertz, who unfortunately has more modern followers than Maxwell. Be that as it may, I find it hard to understand how these equations—or any equations—can have the "astonishing consequence of the emergence of replicating molecules and eventually life." Is it possible to jump from equations to molecules and then to life? Indeed, I am baffled how the "abstract structures of pure mathematics . . . provide the clue to understanding the world." Couple this with the statement that "mathematics is the free creation of the human mind," and we seem to be in deep trouble as Christians.

Is mathematics the free creation of the human mind? Some modern mathematicians might agree, although the Greeks seem to have thought otherwise. But is it not true that differential geometry is essentially an experimental subject? Surely Gauss' and Riemann's ideas which underlie relativity do not "involve a distortion of space-time," but embody a discovery of its curvature?

Underlying the article seems to be the assumption that understanding can be derived from thought without measurement, and can exist apart from persons. Can meaning and purpose be defined apart from personality? If it can, does this strengthen Christian faith?

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Founded in 1941 out of a concern for the relationship between science and Christian faith, the **American Scientific Affiliation** is an association of men and women who have made a personal commitment of themselves and their lives to Jesus Christ as Lord and Savior, and who have made a personal commitment of themselves and their lives to a scientific description of the world. The purpose of the Affiliation is to explore any and every area relating Christian faith and science. *Perspectives* is one of the means by which the results of such exploration are made known for the benefit and criticism of the Christian community and of the scientific community.

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